

NEW SOUTH WALES  
DEPARTMENT OF AGRICULTURE

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CONTRIBUTIONS  
FROM THE  
NEW SOUTH WALES  
NATIONAL HERBARIUM



*Flora Series : Nos. 24-25*

1966

G 9279

# CONSPECTUS OF FAMILIES OF VASCULAR PLANTS REPRESENTED IN THE FLORA OF NEW SOUTH WALES

(The account of each family, or consecutive group of families as issued, will appear with separate pagination; the names of those families that have been published to date are in italics.)

## GYMNOSPERMAE

- |                        |                       |
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| 2 <i>Podocarpaceae</i> | 5 <i>Cupressaceae</i> |
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- |                             |   |
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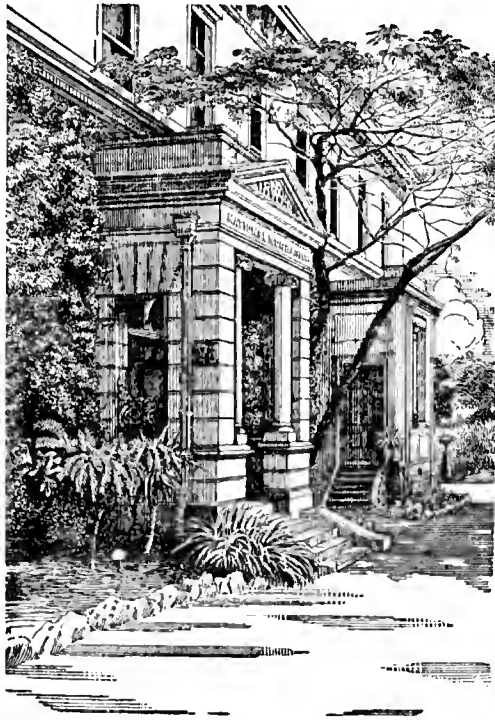
- |                            |                            |
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| 60 <i>Olacaceae</i>        | 82 <i>Eupomatiaceae</i>    |
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# FLORA OF NEW SOUTH WALES

by

VARIOUS BOTANISTS

Produced under the Direction of

K. MAIR

Director and Chief Botanist,

National Herbarium of New South Wales

No. 24    FLAGELLARIACEAE

No. 25    RESTIONACEAE

EDITOR: JOYCE W. VICKERY

[Formerly produced under the direction of R. H. Anderson, 1961-1964]



## 24. FLAGELLARIACEAE

(By O. D. Evans)

Flowers actinomorphic, hermaphrodite or unisexual, rather small, arranged in terminal panicles. Perianth hypogynous. Tepals 6, free, imbricate, in 2 series. Stamens 6, hypogynous; filaments free from each other; anthers basifixed, erect, 2-locular, the loculi opening by an introrse longitudinal slit. Ovary superior, sessile, 3-locular; ovules solitary in each loculus; stigmas 3. Fruit indehiscent, drupaceous. Seeds 1-3 with copious endosperm and a small embryo.

Erect or climbing perennials. Leaves many-nerved, often long; bases sheathing, embracing the stem, open or closed.

A family of 2 genera and about 8 species, found in the tropics and subtropics of the Old World, especially the Melanesian region. One species extends to Australia. The Malesian genus *Hanguana* Bl., often referred to Flagellariaceae, is excluded from the concept and description adopted here; it differs considerably in pollen and epidermis as well as gross morphology and probably is not closely related to the family.

### FLAGELLARIA L.

Robust, leafy, glabrous, herbaceous climbers. Stems terete, solid, covered in the upper part with the persistent sheathing bases of the leaves. Leaves lanceolate to narrow-lanceolate, subsessile, with many parallel nerves, the apex produced into a spirally twisted tendril by which the plant climbs; sheaths tubular, closed or open. Flowers small, hermaphrodite. Tepals free, membranous, coloured or white, persistent, the 3 inner the largest. Stamens exceeding the perianth. Ovary narrow, obtusely triangular; style deeply divided into 3 linear-clavate stigmatic lobes. Fruit nearly globular, drupaceous, 1- or rarely 2-locular, with 1 seed in each loculus.

A genus of 5 species found in the tropics and subtropics of the Old World from Africa to the Pacific, one of which extends to Australia.

*F. indica* L., Sp. Pl. (1753) 333; R. Br., Prodr. (1810) 254; Benth., Fl. Austral. VII (1878) 10; J. H. Maiden, Usef. Pl. Austral. (1889) 188, 539, 623; Moore & Betche, Handb. Fl. N.S.W. (1893) 437; F. M. Bail., Qld. Fl. V (1902) 1658; Domin in Bibl. Bot. XX (1915) 504; Maiden & Betche, Census N.S.W. Pl. (1916) 36; Ewart & Davies, Fl. N. Terr. (1917) 65; C. A. Backer in Fl. Males., ser. I, IV<sup>3</sup> (1951) 246; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 430. Perennial glabrous climber, ascending trees to a height of 15 metres (or more) or spreading over shrubs to a greater distance. Rhizome stout, creeping, branching. Roots ca. 5 mm. diam. Stem herbaceous but hard, becoming woody near the base, terete, solid, up to 2 cm. thick. Leaves distichous, lanceolate to linear-lanceolate, rounded or slightly cordate at the base, abruptly contracted into a short flat petiole, mostly 7-50 cm. long excluding the narrow spirally twisted tip, 1-2 cm. wide; sheaths closed, variable in length up to 15 cm., green with numerous parallel nerves which converge into the petiole. Panicle erect, much branched, up to 20 cm. long and to 25 cm. wide. Flowers numerous, strongly protandrous, sessile in short dense spikes on the ultimate branches of the panicle, each subtended by a small scale-like bract. Tepals 2-2.5 mm. long, ovate, rounded, white, membranous. Stamens exserted; anthers linear, 1.5-2 mm. long. Fruit red, smooth, 4-6 mm. diam. Fl. Summer. A chromosome number of  $2n = 38$  has been reported by Briggs in Contrib. N.S.W. Nat. Herb. IV (1966) 25 from New South Wales material. In material from Taiwan,  $n = 19$  has been recorded by Chuang et al. in Taiwania VIII (1962) 51-66.

*F. indica* var. *gracilicaulis* F. M. Bail., Qld. Fl. V (1902) 1658. For extra-Australian synonymy see Backer in Flora Malesiana, ser. I, IV<sup>3</sup> (1951) 246.

North and Central Coast, in or near rainforest. Tweed R. district, Betche 3.1896 (47580); Acacia Creek, near Mt. Wilson, Macpherson Range, Dunn 10.1916 (47591); Billinudgel, N of Mullumbimby, Boorman 1.1914 (47607); Whian Whian State Forest, N of Lismore, Constable 1.1953 (22176), 5.1964 (65112); Whian Whian State Forest, N of Lismore, Johnson & Constable 6.1957 (47581); Alstonville district, Tomlins before 1917 (47583); Casino, McAuliffe 5.1910 (47584); Woodburn, Maiden & Boorman 11.1903 (47585); Upper Copmanhurst, Boorman 10.1909 (47586); Coramba, Boorman 11.1912 (47587); Port Macquarie, Betche 2.1882 (47588); below Bulga Falls, N of Wingham, Hubbard 1.1950 (47593); Manning R., before 1890 (47594); Seal Rocks, 20 miles E of Bulahdelah, Briggs 8.1964 (64995); Crawford R., near Bulahdelah, Cheel 10.1902 (47595); Point Clare, Hurley 10.1934 (47596); National Park, Fraser 10.1935 (47597); Royal National Park, Constable 3.1964 (64347). LORD HOWE ISLAND: Maiden 4.1898 (78993); Watts 8.1911 (78994, 78995); McComish 12.1936 (78996). Also in Queensland, the Northern Territory, North-west Australia, Malesia and tropical Asia.

The African plants sometimes referred to *F. indica* differ in the open sheaths and in the inflorescence and belong to *F. guineensis* Schum.

*F. indica*, with its wide geographic range, is a rather variable species in minor characters but there seems little point in recognising infraspecific categories, at least without detailed population study. The plants from the Northern Territory and North-western Australia are often glaucous, a feature not noticed in the New South Wales representatives. Leaf and stem size is much greater on the lower parts of the plant than on the ends of the flowering shoots.

It has been reported that the cane-like stems of *F. indica* have been used by the aborigines for many purposes in lieu of bamboos; they have also sometimes been used for walking sticks.

## 25. RESTIONACEAE

(By L. A. S. Johnson and O. D. Evans)

Mostly dioecious, occasionally monoecious or, rarely, with hermaphrodite flowers. Flowers small, each in the axil of a more or less scarious glume; bracteoles 1-2, or more commonly absent. In most genera the flowers are arranged in spikelets with imbricate rigid glumes, of which several of the outer are usually empty. In several genera the flowers are not arranged in definite spikelets but in spike-like panicles with the glumes not or scarcely imbricate. Spikelets, when present, 1- to many-flowered, either similar or different in the two sexes, solitary and terminal, or axillary, or arranged in a racemose inflorescence. Male and female inflorescences either similar or considerably different. Perianth regular, of 3-6 glume-like or scarious erect tepals in 2 series. Male flowers: stamens 3, opposite the inner tepals; filaments free and filiform or rarely short; anthers 1-locular or less commonly 2-locular, dorsifixed, opening longitudinally by slits; rudimentary ovary present or absent. Female flowers: staminodia 2, 3, or absent; ovary superior, sessile or shortly stipitate, 1- to 3-locular according to the number of carpels fully developed; styles 1-3; ovule solitary in each loculus, pendulous. Fruit dry, 2- to 3-angled, usually opening along the angles, or 1-locular and opening along one side, or a small nut.

Perennial herbs with a rush- or sedge-like habit and tufted or creeping rhizomes which are usually clothed with closely imbricate scales. Culms (aerial stems) green, terete to angular or flattened, simple or branched, erect or flexuose, solid or fistular. Leaves in adult plants reduced to dry sheathing scales which sometimes bear a small linear or subulate lamina, except in *Anarthria* (not in N.S.W.) which has fully developed leaf-blades. Leaf-sheaths or scale-leaves closely imbricate near the base of the stem and more distant higher up; margins of the sheaths overlapping, at least at the base.



A family of about 30 genera and more than 250 species, mostly confined to Australia and South Africa. 13 genera are endemic to Australia. As at present defined the genus *Restio* occurs in both Australia and South Africa but this large group is probably not a natural one. One genus, *Calorophus*, occurs in both Australia and New Zealand. Another, *Leptocarpus*, while chiefly Australian, has species in Vietnam, New Zealand and Chile. As currently recognised, *Sporadanthus*, related to the Australian *Lepyrodia*, is endemic in New Zealand.

Superficially many members of the family resemble Cyperaceae, from which, however, they are readily distinguished vegetatively by the "open" leaf sheaths. In some cases male and female plants require careful matching on vegetative features since they may differ considerably in inflorescence and spikelets. Separate keys are provided for male and female material.

The Restionaceae form part of the "Australian" element of the flora, occurring usually in sclerophyll communities in acid soils, often under more or less swampy conditions. They are of no direct economic importance.

Anatomical characters, especially of the culms, show many interesting features and differences between genera, and have been used in arriving at some of the conclusions embodied in the present treatment. A comprehensive survey of the family, using morphological, anatomical and cytological characters, is being carried out by L. Johnson and B. G. Briggs at the National Herbarium of New South Wales, and some changes in the delimitation of genera (especially *Lepyrodia*, *Restio* and *Calorophus*) will probably ensue as they are better understood. A study of the comparative anatomy at the Jodrell Laboratory, Kew, has resulted in a proposal for the segregation of the Western Australian genera *Anarthria* R. Br. and *Ecdeiocolea* F. Muell. from the Restionaceae into two distinct families (Cutler & Airy Shaw, Kew Bull. XIX (1965) 489-499). There is much to be said for the second of these, at least, and the matter is currently under investigation; it will not directly affect the N.S.W. representatives.

#### KEY TO PLANTS WITH FEMALE INFLORESCENCES

1. Ovary 2- to 3-locular. Styles and style-branches 2-3. Fruit a capsule.
  2. Flowers not in true spikelets, more or less loosely and paniculately arranged, the lateral branches sometimes reduced to almost sessile clusters and the panicle often spike-like. Glumes loose, not closely imbricate, often shorter than the tepals. Bracteoles 1-2. Ovary 3-locular; styles or style-branches 3 ..... *Lepyrodia* 1.
  - 2.\* Flowers in both sexes arranged closely in true spikelets or, if the female spikelets are 1-flowered, then the flower surrounded by imbricate barren glumes. Glumes longer than the tepals. Bracteoles absent. Ovary 2-locular; styles or style-branches 2 (in N.S.W. species) ..... *Restio* 2.
- 1.\* Ovary and fruit 1-locular. Styles and style-branches 1 or 3. Fruit a nut or, rarely, splitting down one side.
  3. Plants monoecious. Male spikelet terminal, solitary; female spikelets solitary in the axils near the base of the culm. Style 1, undivided ..... *Coleocarya* 6.
  - 3.\* Plants dioecious. Style-branches 3.
    4. Female spikelets axillary (in N.S.W. species), 1-flowered with several barren glumes. Upper leaf-sheaths green, with a spreading or reflexed subulate tip ..... *Calorophus* 5.
    - 4.\* Female spikelets terminal. Leaf-sheaths not as above.

5. Female spikelets several-flowered. Culms mostly unbranched (in N.S.W. species) except within the inflorescence, straight, not apparently striate ..... *Leptocarpus* 3.
- 5.\* Female spikelets 1-flowered. Culms mostly much branched, often flexuose, striate (in N.S.W. species) ..... *Hypolaena* 4.

† KEY TO PLANTS WITH MALE INFLORESCENCES

1. Bracteoles present. Flowers not in definite spikelets, more or less loosely and paniculately arranged, but the branches sometimes reduced to more or less sessile clusters and the panicle often becoming spike-like ..... *Lepyrodia* 1.
- 1.\* Bracteoles absent. Flowers in true spikelets.
2. Monoecious; male spikelets terminal and solitary; female spikelets solitary in the axils near the base of the culm ..... *Coleocarya* 6.
- 2.\* Dioecious or, if rarely monoecious, the inflorescence not as in 2.
3. Male spikelets axillary. Upper leaf-sheaths green with a spreading or reflexed, subulate tip ..... *Calorophus* 5.
- 3.\* Male spikelets either terminal (solitary or in an inflorescence) or if axillary then leaf-sheaths not as in 3.
4. Male inflorescence or individual spikelets either erect or if drooping then spikelets 3-5 mm. diam. Anthers exerted (in N.S.W. species) ..... *Restio* 2.
- 4.\* Male inflorescence or individual spikelets nodding or drooping. Spikelets less than 3 mm. diam. Anthers not exerted.
5. Culms mostly unbranched, straight, smooth, greyish with closely appressed, minute, scale-like trichomes. Spikelets ca. 1 mm. diam., 3-4 mm. long ..... *Leptocarpus* 3.
- 5.\* Culms mostly branched, often flexuose, striate, hoary-tomentose when young. Spikelets ca. 2 mm. diam., up to 8 mm. long ..... *Hypolaena* 4.

1. *LEPYRODIA* R. Br.

Monococious or dioecious or, rarely, with hermaphrodite flowers (1 species). Rhizome hard, creeping or tufted, covered, at least when young, with closely appressed scarious scales. Culms green, erect or rarely scrambling, terete or slightly compressed, simple or branched, bearing persistent sheathing scales which are crowded and imbricate at the base but distant or absent on the aerial portion; leaf blades reduced to a small linear or terete lamina or absent. Inflorescence either terminal and more or less loosely paniculate or spike-like, or the partial inflorescences axillary and clustered. Male and female inflorescences when separate not very different. Flowers not in definite spikelets. Glumes not or scarcely imbricate; bracteoles 1 or 2 beneath each flower. Tepals 6, glume-like and rigid or thin and almost hyaline, acute, usually longer than the glumes. Male flowers: stamens 3; filaments free; anthers 1-locular. Female flowers: staminodes usually 3; ovary 3-angular, 3-locular, with one ovule in each loculus; styles 3, filiform. Capsule 3-locular, opening at the angles. Seed ellipsoid.

† Since some genera are not distinguishable as a whole on male characters alone, this key uses the characters of the New South Wales species where necessary.

A genus of about 20 species confined to Australia. 7 species occur in New South Wales. The single New Zealand species sometimes placed in this genus is probably better referred to the genus *Sporadanthus* F. Muell. which differs in the gynoecium. In *Lepyrodia* two groups of species, anatomically distinguished by the arrangement of the spongy tissue in the chlorenchyma of the culms, are recognised by Johnson and Evans in Contrib. N.S.W. Nat. Herb. III (1963) 223-227. So far as is known these correspond with the chromosome numbers of  $2n = 14$  and 18 respectively, as determined by Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 228-232, and IV (1966) 24-34. However, these groups are not readily distinguishable as a whole by external characters, though other anatomical differences are now known to exist. It should be pointed out that *L. muirii* F. Muell. was inadvertently listed in the wrong group by Johnson & Evans, and that (as pointed out by Dr. D. F. Cutler, pers. comm.) *L. glauca* F. Muell. has distinctive anatomical characters which set it aside from other species. The generic position in *Lepyrodia*, including the relationship of one group with *Sporadanthus*, is being investigated.

1. Flowers in clusters which are either distant along the rachis of the inflorescence or, more rarely, few or solitary at the apex of the culm, each cluster in the axil of a broad bract. Cauline sheaths bearing a small, terete, reflexed but deciduous lamina ..... *L. interrupta* 6.
- 1.\* Flowers in a panicle which is sometimes small, narrow and spike-like. Cauline sheaths not as above.
  2. Sheaths absent from the aerial portion of the culm or, if present, not more than 1. Culms unbranched, often numerous, thin and weak, or if stouter then fewer and often compressed ..... *L. anarthria* 4.
  2. Cauline sheaths present, 2 or more on each culm.
    3. Sheaths all loose and open. Culms usually unbranched. Plants dioecious ..... *L. scariosa* 3.
    - 3.\* Some or all of the sheaths on the culm closely appressed, except where subtending a branch. Monoecious or dioecious.
      4. Culms 0.5-0.75 mm. diam., thin and wiry, 15-50 cm. high, the surface mostly rugulose-pitted ..... *L. leptocaulis* 2.
      - 4.\* Culms usually 1-3 mm. in diam., 50-200 cm. high, the surface smooth for the most part.
        5. Outer tepals shorter than the inner, not exceeding 2 mm. long; inner tepals reddish when fresh. Bracts and glumes very thin, soon breaking up, inconspicuous ..... *L. gracilis* 5.
        - 5.\* Outer and inner tepals about equal in length or the outer slightly longer, whitish or straw-coloured. Bracts and glumes persistent, often conspicuous.
          6. Culms not usually exceeding 2 mm. diam. over all at the base, 0.1-1.0 cm. apart on the rhizome, 40-70 cm. high. Sheaths at the base of the culm not exceeding 5 cm. in length, those on the upper portion of the culm usually dull and often striate. Secondary bracts and glumes acute, acuminate, with a short fine point ..... *L. muelleri* 1.
          - 6.\* Culms up to 5 mm. diam. over all at the base, often 2-2.5 cm. apart on the rhizome, 70-200 cm. high, erect or scrambling. Sheaths at the base of the culm up to 10 cm. long, those on the upper portion of the culm smooth, minutely pitted with transverse rows of stomata. Apex of secondary bracts and of glumes often attenuated and filiform .. *L. caudata* 7.

1. *L. muelleri* Benth., Fl. Austral. VII (1878) 215; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 228; Moore & Betche, Handb. Fl. N.S.W. (1893)

442; Rodway, Tas. Fl. (1903) 233; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Ewart, Fl. Vic. (1931) 255; Black, Fl. S. Austral. ed. 2, I (1943) 173; J. H. Willis, Handb. Pl. Vic. (1962) 273; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 485. Monoecious. Rhizome shortly creeping or tufted, 2–5 mm. diam. Culms erect, terete, simple or slightly branched, 1–2 mm. diam., ca. 40–70 cm. high, glabrous, smooth, 0.1–1.0 cm. apart on the rhizome. Sheaths closely appressed except when subtending a branch, 1–3 cm. long on the aerial portion of the culm, sometimes much longer on the basal portion but not exceeding 5 cm. Inflorescence a terminal, erect, narrow panicle, up to 15 cm. long, with short dense branches, the lower usually distant. Subtending bracts on the main axis erect, broad, loose, striate, pale, scarious, with membranous margins. Bracts on the branches and the glume subtending each flower acute to acuminate. Flowers either all of one sex, or the upper male and the lower female. Tepals 1.75–2.5 (–3) mm. long, straw-coloured, the inner equal in length to the outer or slightly shorter. Chromosome number:  $2n = 14$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 228). Fl. Summer.

North and Central Coast and eastern margin of the Central Tablelands in wet sandy or peaty soil and in swamps; to be expected on the South Coast also. Hat Head, E of Kempsey, Constable 1.1953 (22088); Manning R., Cheel 12.1899 (48175); between Anna Bay and Nelson Bay, Port Stephens district, Johnson & Briggs 1.1962 (60651); Wallaby Swamp, Mellong Range, Windsor to Singleton road, Constable 4.1962 (57456); 1½ miles N of Grassy Hill, Mellong Range, Johnson 5.1962 (57110); near Richmond, 11.1910 (48176); Londonderry, Woolls (48178); Centennial Park, Sydney, Cheel 11.1899 (48179); Maroubra, Blakely 1.1911 (48181); Malabar, Evans & Constable 11.1960 (56923); Malabar, Evans & Johnson 1.1962 (60694); Botany Swamps, La Perouse Road, Camfield 12.1897 (48182); La Perouse, Botany Bay, Evans 1933 (48180); Picton Lakes, McBarron No. 8774, 1.1964 (65815); Picton to West Bargo, Maiden 7.1893 (48183); near Edina Falls, Hill Top, Evans & Constable 2.1960 (56924). Also in Victoria, South Australia and Tasmania.

The species is found in wetter situations than the much more common *L. scariosa*.

The name *L. tasmanica* Hook. f. was misapplied to this species by F. Mueller, Fragm. VIII (1873) 175.

**2. *L. leptocaulis* L. Johnson et O. Evans in Contrib. N.S.W. Nat. Herb. III (1963) 225.** Monoecious. Rhizome mostly shortly creeping, 2–4 (–5) mm. diam. Culms erect, terete, wiry, simple or branched, 0.5–0.75 mm. diam., 15–50 cm. high, glabrous but with the surface minutely wrinkled or pitted, rarely smooth; sheaths often appressed when not subtending branches, otherwise loose, 6–10 mm. long. Inflorescence a narrow terminal panicle consisting of up to 30 flowers; principal subtending bracts loose, similar in shape to the sheaths on the culm but diminishing in size upwards. Bracts on the lateral branches and the glumes subtending each flower scarious, lanceolate, acute. Bracteoles membranous, acute. Male and female flowers often in the same inflorescence, the males above, the females near the base. Tepals 1.5–3.0 mm. long, the inner and outer about the same length or the outer slightly longer. Capsule 3-locular, depressed-globose; seeds ellipsoid, greyish, ca. 0.75 mm. long. Chromosome number:  $2n = 14$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 228). Fl. Summer.

Northern part of the Northern Tablelands, North and Central Western Slopes in acid granite or sandstone country, in moist soil. Near Torrington, Phillips 2.1961 (56922); 2 miles W of Torrington, Constable 5.1961 (56903), 3.1962 (57104, 61063); 5 miles NW of Torrington, Briggs 8.1964 (64876); Gilgai, S of Inverell, Jessup & Gray 12.1953 (48177); near Ulan, NNE of Mudgee, Constable 1.1964 (67676). Also in Queensland, Darling Downs District.

When originally describing *L. leptocaulis*, we laid stress on its difference from *L. muelleri* but overlooked the much closer relationship with *L. valliculae* J. M. Black, of South Australia. The last is in turn very close to *L. hermaphrodita* of Western Australia (from which *L. macra* Nees cannot be specifically distinguished). The three taxa *L. hermaphrodita*, *L. valliculae* and *L. leptocaulis* could perhaps be equally well treated as either subspecies or species, but for the present, at least, specific rank is maintained, since intermediate specimens are not known and there is little difficulty in determination. However, this is probably due chiefly to the geographic

isolation between populations. The chromosome number is the same in *L. hermaphrodita* and *L. leptocaulis* (Briggs, loc. cit.) but is unknown in *L. valliculæ*. The culm anatomy is essentially the same in all three, except for some size difference. *L. leptocaulis* is distinguished from the other two species by its relatively thick, long, creeping rhizome. *L. valliculæ* and *L. hermaphrodita* both have very thin, short, ascending rhizomes and a tufted habit. *L. hermaphrodita* has the longest flowers of the three (outer tepals of the female flowers 2.5–4.0 mm., as against 1.5–2.5 mm. in *L. leptocaulis*). *L. valliculæ* is distinguished from it only by its rather shorter flowers and very slender culms. Hermaphrodite flowers are more regularly found in some forms of *L. hermaphrodita* than in the remainder of the group.

3. *L. scariosa* R. Br., Prodr. (1810) 248; Kunth, Enum. Pl. III (1841) 476; F. Muell., Fragm. VIII (1873) 72; Benth., Fl. Austral. VII (1878) 215; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 224; Moore & Betche, Handb. Fl. N.S.W. (1893) 442; F. M. Bail., Qld. Fl. VI (1902) 1721; Domin in Bibl. Bot. XX (1915) 505; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 485. Dioecious. Rhizome shortly creeping, 2–5 mm. diam. Culms erect, terete, usually unbranched, glabrous, minutely wrinkled or almost smooth, 0.75–2 (–4) mm. diam., 30–100 cm. high. Sheaths 2–5 (–6) on the aerial portion of the culm, lax and often somewhat reflexed, pale to dark brown, 1–3 (–4) cm. long, those at the base closely appressed, 1–4 cm. long. Inflorescence a narrow panicle, 2–8 (rarely –25) cm. long, with short erect branches, the lower sometimes distant with the upper more crowded. Subtending bracts on the main axis of the inflorescence erect or slightly reflexed, pale or brown, scarious, the apex acute and attenuate or short. Bracts on the branches and the glume subtending each flower membranous, shorter or not longer than the flower. Bracteoles 1 or 2, sometimes as long as the tepals, hyaline. Tepals in both sexes lanceolate, acute, rigid, pale brown, 3–4 (–5) mm. long, the inner shorter than the outer or sometimes nearly equal. Capsule ca. 1.5 mm. long, crowned with persistent style bases. Seed ca. 0.5 mm. long, covered with even rows of raised dots. Chromosome number:  $2n = 14$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 288). Fl. Summer.

Coast and Tablelands, in moist sandy or peaty soil in heath and woodland and near margins of swamps, often abundant. Gibraltar Range, 41 miles NE of Glen Innes, Constable 5.1961 (60935); Gibraltar Range, Williams & Winterhalter 10.1958 (48337); Bareongere State Forest, near Corindi, Floyd 9.1959 (48338); Port Macquarie, Maiden 1894 (48340); Mellong Range, Windsor-Singleton road, Johnson 5.1962 (57009); 11 miles N of Gosper's (Uraterer) Mtn. airstrip, E of Glen Alice, Rodd & McGillivray 4.1965 (74301); 3 miles W of Clarence, Johnson & Briggs 5.1962 (57107); Clarence, Boorman 8.1908 (48324); Clarence-Lithgow road, Johnson & Constable 7.1951 (19305); Newnes Junction, W of Waterworks, Constable 8.1953 (25754); Bell-Lithgow road, Constable 3.1950 (11296); Mt. Wilson, Maiden 4.1896 (48323); Mt. Wilson, du Faur's Rocks, Johnson 9.1949 (48322); Mt. Victoria, Maiden 9.1898 (48331); Blackheath, Boorman 3.1915 (48326); Blackheath, Constable 2.1960 (61750); Govett's Leap, Blackheath, Constable 2.1962 (57455); Katoomba, Johnson & Briggs 5.1962 (57106); Minnehaha Falls, Katoomba, Constable 1.1961 (53269), 1.1962 (57043), 8.1964 (64782); Leura, Sulman 2.1908 (48327); Mt. Solitary, 5 miles S of Katoomba, Constable 11.1960 (60933); Wentworth Falls, Blakely 3.1938 (48328); Wentworth Falls, Hamilton 1.1915 (48329); Wentworth Falls, Camfield 4.1899 (60855); Hazlebrook, Constable 3.1949 (19591); Springwood, Cross 3.1934 (48330); Warrah Reserve, Pearl Beach, Mair 1.1948 (16268); Salvation Creek, Ku-ring-gai Chase, W of Pittwater, Johnson 4.1951 (48303); Berowra, Boorman 10.1899 (48305); Berowra, Salasoo 8.1951 (48304); Berowra, Carne & Hudson 2.1914 (48306); Hornsby, Blakely 6.1914 (19860); Castlereagh-Agnes Banks road, Constable 11.1960 (57017), 1.1961 (61751), 1.1962 (60695); Cheltenham, Johnson 11.1945 (48308), 11.1946 (48309); Killara, Blakely & McKie 4.1937 (48307); Manly Water Reserve, Briggs & Johnson 1.1962 (56879); North Head, Port Jackson, Briggs 1.1962 (60687); Middle Harbour, Port Jackson, Rodway No. 1059, 4.1933 (57012); Rose Bay, Sydney, Boorman 4.1906 (60856); Port Jackson, Brown 1802-5 (BM) female, HOLOTYPE, seen; Port Jackson, Betehe 12.1882 (48310); Centennial Park, Sydney, Cheel 1.1899 (48311, 48312, 48314), 2.1899 (60857, 60858); Kensington, Boorman 2.1902 (48313); Botany Bay, Boorman 1.1908 (48315); Malabar, Evans & Johnson 1.1962 (60688); Malabar, Gibbons 8.1964 (64749); Carlton, Camfield 2.1903 (48316); Tom Ugly's Point, George's River, Camfield 8.1902 (48317); Como, Camfield 1.1908 (60859, 60860); Sutherland, Camfield 1.1896 (60862); Loftus, Camfield 2.1897 (48318); Port Hacking River, Camfield 3.1897 (60861); Mt. Pindari,

Kanangra Tops, Johnson 10.1948 (48332); Oakdale to Burragorang Lookout, Johnson 9.1951 (48333); 2 miles N of Cordeaux Dam, Johnson 5.1951 (20729); Picton Lakes, McBarron No. 8787, 1.1964 (65814); Hill Top, Picton to Mittagong, Maiden 1.1896 (48334); Hill Top, Evans 2.1960 (60934); Fitzroy Falls, Rodway 4.1925 (57005); The Barren Grounds, W of Kiama, Constable 2.1959 (57016); Woodhill Bluff, Berry-Broger's Creek road, Rodway 9.1930 (57010); 5 miles N of Paddy's River, Moore 11.1952 (48335); Barber's Creek, Tallong, Maiden 2.1898 (48336); Budgong Creek, Nowra district, Gray No. 5247, 7.1962 (66468); near Nowra, Rodway 8.1922 (48321, 57003); Nowra Creek crossing on Yalwal road, Rodway 3.1925 (57004); Lighthouse road, 8 miles from Nowra, Rodway No. 66, 9.1930 (57007); Falls Creek, S of Nowra, Rodway 9.1918 (56999), 11.1928 (57006), No. 302, 1.1931 (57008); Bowen Is., Jervis Bay, Rodway 12.1919 (48320, 57001); near Pacific City, Jervis Bay, Rodway No. 336, 2.1931 (57011), No. 337 (57009); near Royal Naval College, Jervis Bay, Rodway 11.1919 (57000); near Sassafras, Upper Clyde R., Rodway No. 3104, 6.1940 (61773); Sassafras Falls, Rodway 6.1941 (56998); 1 mile S of Sassafras, Nowra to Braidwood road, Briggs 12.1961 (60644); 2 miles ENE of Mt. Tianjara, Jerrawangala State Forest, Pigeon House Range, Johnson 4.1960 (50303); 10 miles SE of Nerriga, Sturgess 4.1944 (57013); Green Cape, Rodway 12.1920 (57002). Also in southern coastal Queensland.

Some variation in the inflorescence and in individual flowers has been found on very rare occasions; whether due to fungus infection or not is uncertain. Plants with crimson stigmas have been found growing in the same area as others with normal whitish stigmas.

A coarse form with culms up to 3.5 mm. thick, and which exhibits branching of the culms, occurs (as well as more or less typical slender forms) in southern coastal Queensland. A poor specimen apparently belonging to this form (No. 48340) was collected many years ago at Port Macquarie. It could therefore probably be found in other parts of the North Coast. The same chromosome number has been found in both coarse and slender forms and there is probably no sharp morphological distinction between them. *L. caudata* (q.v. for distinctions) has been confused with this large form of *L. scariosa*.

Victorian material mentioned by Ewart, Fl. Vic. (1931) 255, has since been referred to *L. muelleri* Benth. However, in view of the occurrence of *L. scariosa* at Green Cape, N.S.W., it would not be surprising to find it in far eastern Victoria.

Possible hybridism with *L. anarthria* is discussed under the latter species.

**4. *L. anarthria* F. Muell. ex Benth.**, Fl. Austral. VII (1878) 216; F. Muell., Fragm. VIII (1873) 73 (nom. provis.); Masters in A. & C. DC, Monogr. Phanerog. I (1878) 225; Moore & Betche, Handb. Fl. N.S.W. (1893) 442; Maiden & Betche, Census N.S.W. Pl. (1916) 37; J. H. Willis, Handb. Pl. Vic. (1962) 272; Beadlc, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 485. Apparently dioecious. Rhizome shortly creeping or densely tufted, 2–8 mm. diam. Culms 30–70 cm. high, 0.5–2 mm. diam., unbranched, terete or slightly flattened; sheaths confined to the base of the culm or a single one on the aerial portion, those at the base erect, appressed, 1–10 (–15) cm. long, the upper, when present, loose, reflexed, or (rarely) appressed, 1–4 cm. long. Inflorescence a terminal, erect, narrow panicle 1–5 cm. long. Subtending bracts on the main axis erect, lanceolate, acute, pale and membranous, often much longer than the subtended branch of the inflorescence, the apex attenuate. Secondary bracts and the glume under each flower lanceolate, acute, membranous, the apex attenuate and often filiform. Tepals pale, narrow, 2.5–4.5 mm. long, the inner and outer about equal in length or the outer slightly longer. Chromosome number:  $2n = 14$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 228). Fl. Summer.

Tablelands, Central and South Coast, in or near swamps and in wet or damp peaty soils. Torrington to Bismuth road, Constable 5.1961 (56834); Gibraltar Range, NE of Glen Innes, Williams 4.1958 (48189); Gibraltar State Forest, 42 miles NE of Glen Innes, Williams and Winterhalter 10.1958 (48190); 43 mile peg, Glen Innes–Grafton road, Constable 3.1962 (57929); Doughboy Range, Armidale to Grafton road, Gray 11.1953 (48193); Bullock Creek, Point Lookout road, E of Armidale, Millington 1951 (48191, 48192); Annie Rowan Creek, Newnes State Forest, 12 miles N of Newnes Junction, Constable 7.1960 (56835); Eskbank, near Lithgow, Hamilton 1.1915 (48365); 3 miles W of Clarence, Johnson & Briggs 5.1962 (57108); Katoomba, Johnson & Briggs 5.1962 (57105); Minnehaha Falls, Katoomba, Constable 8.1964 (64783);

Blue Mountains, Camfield 4.1897 (57934); Waverley, Sydney, Camfield 3.1897 (48197, 48198); Centennial Park, Sydney, Forsyth 3.1897 (48194, 48195); Centennial Park, Cheel 2.1899 (48196 60857, 60858); Centennial Park, Evans & Johnson 1.1962 (60693); The Big Plain, 5 miles E of Mt. Werong, Johnson & Constable 10.1951 (17760); Pieton Lakes road, Thirlmere, McBarron 4.1962 (57096); near top of Bulli Pass, Rodway 5.1935 (57908); Edina Falls, Hill Top, Picton to Mittagong, Evans & Constable 2.1960 (56831); Parma Creek, 10 miles SW of Nowra, Rodway No. 1789, 7.1935 (48368); Goulburn district, Holford 1957 (48367); summit of Clyde Mtn., 10 miles SE of Braidwood, Constable 3.1961 (56832, 56833); Clyde Mtn., Phillips 4.1961 (55261); near Craigie, 7 miles E of Delegate, Costin 8.1949 (48369). Also in the Wallangarra-Stanthorpe district of southern Queensland, and in East Gippsland, Victoria.

*L. anarthria* includes forms of very varied height and thickness of the culms, and the populations in one area are sometimes constant in respect of these characters. However, all variations occur and it has not been possible to recognise infraspecific categories. The same chromosome number has been found in both large and small forms.

Certain specimens from both Central and Northern Tablelands suggest that there may be hybridism between *L. anarthria* and *L. scariosa* in places. This needs further investigation in the field.

The name *Anarthria gracilis* was misapplied by Kunth, Enum. Pl. III (1841) 478, to this species.

5. *L. gracilis* R. Br., Prodr. (1810) 247; Kunth, Enum. Pl. III (1841) 476; F. Muell., Fragm. VIII (1873) 73; Benth., Fl. Austral. VII (1878) 217; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 225; Moore & Betche, Handb. Fl. N.S.W. (1893) 442; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Beadlc, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 485. Monoecious. Rhizome shortly creeping, 3–8 mm. diam. Culms erect, terete, glabrous, with few or many branches, 1–2 mm. diam., 30–100 cm. high. Sheaths closely appressed except where subtending a branch, 1–3 cm. long. Inflorescence a narrow, erect, terminal panicle, 3–10 cm. long. Bracts on the main axis of the inflorescence much shorter than the branches which they subtend, membranous, fragile, soon weathering and becoming inconspicuous. Secondary bracts and glumes broad-lanceolate, acute, membranous; bracteoles hyaline. Tepals lanceolate to ovate-lanceolate, acute 1.75–2 (–2.5) mm. long, the inner usually distinctly longer than the outer and reddish in colour. Chromosome number:  $2n = 18$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 228). Fl. Spring.

Central Coast, Central Tablelands and northern parts of the Southern Tablelands, in wet sandy soil and margins of swamps. Govett's Leap, Blackheath, Evans & Blaxell 7.1960 (56921); Govett's Leap, Blackheath, Constable 2.1962 (61066); Wentworth Falls, McBarron No. 8704, 1.1964 (65816); Wentworth Falls, McKee 11.1953 (48344); Curl Curl, Deane 9.1884 (60888); Port Jackson, Forsyth 8.1900 (48345); near Bellevue Hill, Sydney, Betche 8.1894 (48346); Centennial Park, Sydney, Forsyth 9.1897 (48350, 48351); Centennial Park, Cheel 8.1899 (48348, 48349); Centennial Park, Chippendale 8.1953 (48347); Centennial Park, Briggs 6.1962 (57719); Waverley, Sydney, Camfield 9.1897 (48352, 48354); Port Jackson, Brown 1802–5 (BM) female, HOLOTYPE, seen; Port Jackson district, Forsyth 8.1900 (48345); Malabar, Johnson & Briggs 5.1962 (61065); Long Bay swamp, Sydney, Evans 1936 (48355); Waterfall, National Park, Maiden 9.1888 (48356); Helensburgh, Whaite 3.1953 (48357); Appin, Maiden 9.1898 (48353); George's R. near Appin, Evans & Blaxell 5.1961 (54120); Broughton Pass, Cataract R., McBarron 3.1962 (57097, 57098); Pigeon House Range, Constable 9.1961 (60659).

*L. gracilis* is closely related to, but quite distinct from, the Victorian and Tasmanian species *L. tasmanica* Hook. f. It is a rather uncommon and inconspicuous species, probably overlooked in some localities.

6. *L. interrupta* F. Muell., Fragm. VIII (1873) 74; Benth., Fl. Austral. VII (1878) 217; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 228; Moore & Betche, Handb. Fl. N.S.W. (1893) 442; F. M. Bail., Qld. Fl. VI (1902) 1721; Maiden & Betche, Census N.S.W. Pl. (1916) 37. Apparently dioecious. Rhizome shortly creeping, 3–8 mm. diam. Culms erect, terete, simple or branched, 30–60 cm. high,

0.5–1 mm. diam. Sheaths closely appressed except where subtending a branch, 5–15 mm. long, bearing a small, terete, usually reflexed but deciduous lamina 3–12 mm. long. Flowers in sessile clusters which are distant along the rhachis of the inflorescence or few or solitary at the apex of the culm, each cluster in the axil of a broad, loose, subtending bract 4–7 mm. long; individual flowers sessile or nearly so, crowded together. Tepals rigid, narrow and acute, red when fresh, 2.5–3.5 mm. long, the inner and outer equal in length or the inner slightly longer. Chromosome number:  $2n = 18$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. Spring.

North Coast, in damp sandy peaty soil and on the edges of swamps. Byron Bay, Boorman 8.1916 (48171); 1 mile W of Byron Bay, Johnson 4.1962 (61192); Lennox Head to Byron Bay, Johnson 4.1962 (57079); Evans R., Bäuerlen 9.1894 (48172); Red Rock, Coff's Harbour district, Floyd 10.1959 (48887); near aerodrome, Coff's Harbour, Hayes & Tindale 8.1961 (60635); Hat Head, E of Kempsey, Johnson & Briggs 1.1962 (60649); Bombah Point, Myall Lakes, Briggs 8.1964 (64722); Port Stephens, Boorman 8.1911 (48173); Port Stephens, Pidgeon & Evans 9.1939 (48174); Nelson Bay to Stockton road, Port Stephens district, Evans 12.1961 (59927). Also in southern coastal Queensland.

A common species in wet coastal heathlands ("wallum").

Victorian material referred to *L. interrupta* by Ewart, Fl. Vic. (1931) 255, belongs to a different species, *L. flexuosa* (Benth.) Johnson & Evans (see Contrib. N.S.W. Nat. Herb. III (1963) 224.)

**7. *L. caudata*** *L. Johnson et O. Evans* in Contrib. N.S.W. Nat. Herb. III (1963) 226. Apparently dioecious. Rhizome creeping, 3–8 mm. diam. Culms erect or scrambling, terete, simple or branched, up to 3 mm. diam., 75–200 cm. high, glabrous, often spaced 2–2.5 cm. apart on the rhizome. Sheaths at the base of the culm up to 10 cm. long, those on the upper portion 1–3 cm. long, closely appressed, glabrous, smooth, brown, minutely pitted with transverse rows of stomata. Inflorescence a short terminal panicle, 2–10 cm. long, with the flowers closely crowded on the lateral branches. Lowest subtending bract on the main axis of the inflorescence similar to the upper sheaths, or the apex acute and scarious; bracts on the lateral branches and the glume subtending each flower membranous, with a filiform tip. Tepals rigid, acute, 2.5–4 mm. long, the inner and outer whorls about the same length or the outer slightly longer. Chromosome number:  $2n = 18$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229).

Far North Coast in wet peaty soil. 1 mile W of Byron Bay, Johnson 4.1962 (57080); 1½ miles NW of Lennox Head, Johnson & Constable 6.1957 (48339); 1½ miles NW of Lennox Head, Constable 5.1962 (61208, 61209). Also in coastal districts of southern Queensland.

*L. caudata* is found in wet "wallum" in places rather difficult of access, and further diligent collecting may therefore be expected to extend its known range.

Until anatomical and cytological studies were made, *L. caudata* was confused with the large form of *L. scariosa*. In fact it is not closely related to that species and may be distinguished from it by external morphological characters also, in particular the appressed sheaths, the shining surface of culms and sheaths with stomata very obvious under a hand lens ( $\times 10$ ), and by the long filiform points on the glumes and bracteoles. The last two features also distinguish it from *L. muelleri*.

The nearest relative of *L. caudata* appears to be *L. stricta* R. Br. of Western Australia which, however, is clearly distinguished by its shorter glumes and smaller flowers.

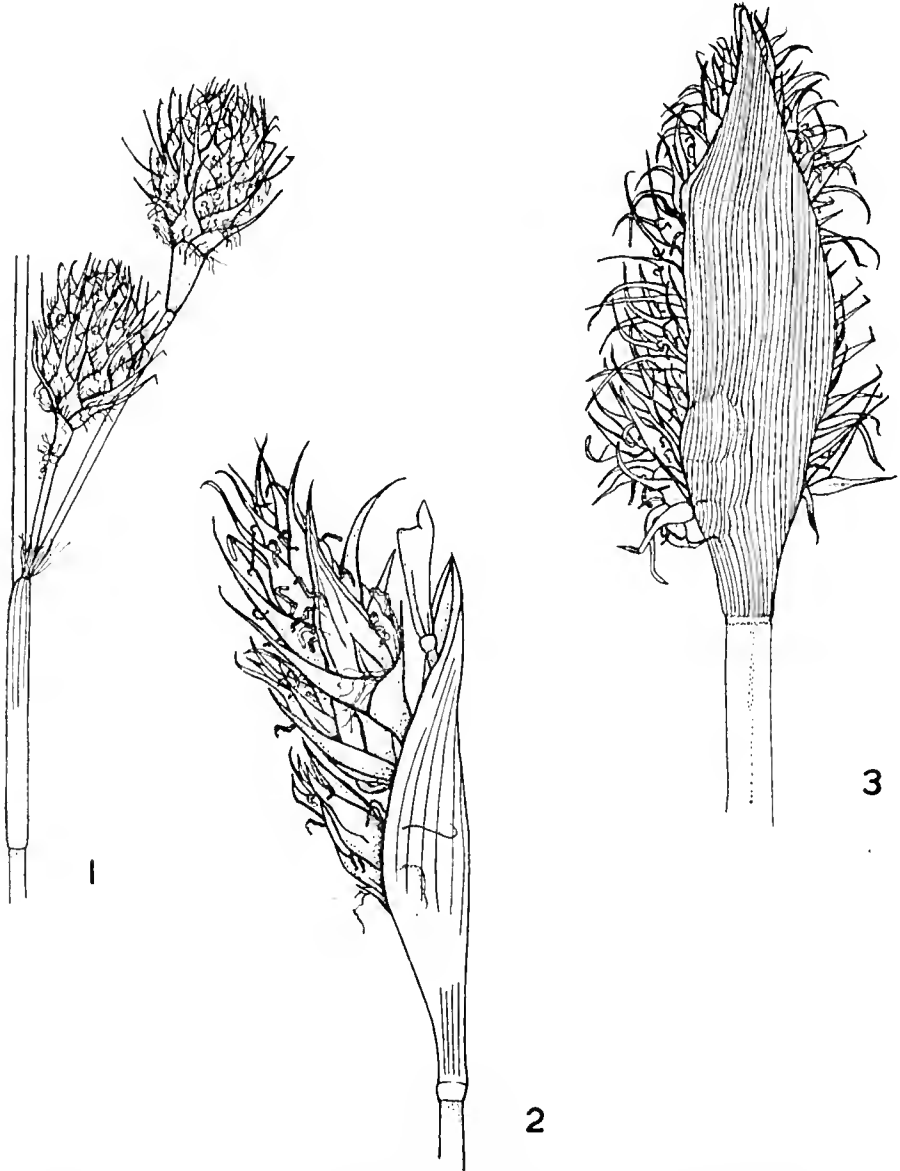
## 2. RESTIO Rottb.

Perennial, dioecious herbs with a hard, creeping, partly erect or tufted rhizome, which is usually covered by imbricate scarious scales, beneath which, in the Australian species, there are dense woolly hairs. Culms green, simple or branched, erect or diffuse, straight or flexuose, bearing persistent sheathing scales which are crowded and imbricate near the base but more distant above; leaf-blades usually absent, except in juvenile plants, but in one or more species a reduced linear or terete



lamina is present. Male and female inflorescences either similar or dissimilar. Flowers in spikelets which are either similar or dissimilar in the two sexes, 1- to many-flowered, sessile or pedicellate, arranged in a raceme or a panicle or solitary and then axillary or terminal. Glumes imbricate; bractcoles absent. Tepals 4-6, glume-like, not exceeding the glumes in length. Male flowers: stamens 3; filaments filiform, free; anthers 1-locular; rudimentary ovary small or absent. Female flowers: staminodes 2 or 3 or absent; ovary 2- or 3-locular; style-branches 2 or 3, more or less united towards the base. Fruit a 2- or 3-locular capsule, often oblique by the abortion of one loculus.

M.D. Tindale del.



Primary bract and partial inflorescence (female)  $\times 3\frac{1}{2}$ . 1. *Restio fimbriatus*.  
2. *R. gracilis*. 3. *R. australis*.



Primary bract and partial inflorescence (female)  $\times 3\frac{1}{2}$ . 1. *Restio pallens*.  
 2. *R. stenocoleus*. 3. *R. longipes*.

There are about 110 species, confined to South Africa and Australia. The Australian species number about 30, all endemic; 11 occur in New South Wales. Most of the remainder are in West Australia. The New South Wales species occur chiefly on sandy or peaty soils which are subject to at least intermittent water-logging.

There is good evidence, from culm anatomy and pollen, that the Australian and South African species referred to *Restio* are not in fact closely related. However, a

satisfactory generic alignment must await more comprehensive studies. Both anatomy and cytology indicate that the Australian species themselves may not all be congeneric. *Restio* was originally described from South African material. It is taken here in the broad sense, as a temporary measure.

The name *Restio* Rottböll, non L., has been proposed for conservation; see Bullock in Taxon VIII (1959) 107, 196.

The *Restio gracilis* complex is dealt with in more detail by Johnson and Evans in Contrib. N.S.W. Nat. Herb. III (1963) 200–217. Partial inflorescences of six of these species are illustrated here on pp. 11 and 12.

Chromosome numbers of all New South Wales species have been determined by Briggs (Contrib. N.S.W. Nat. Herb. III (1963) 228–217).

The species in the *R. gracilis* complex (Nos. 5–10) exhibit considerable variability in almost every feature which might be used for key purposes. When using this key, therefore, it will be advisable to consider as wide a range of characters as possible and to check against the specific descriptions. Measurements of the diameter of the rhizomes are taken to include the clothing of scale-leaves.

A number of specimens of various species have been found to be infected by a smut fungus which appears to cause irregularities of growth, resulting in elongation of the inflorescence and multiplication of the branches, spikelets and parts of the flower. Even apparently hermaphrodite flowers may result. The key and descriptions do not cover such aberrant individuals and the possibility of fungal infection should be borne in mind when specimens which do not fit the key are encountered.

1. Leaf blades absent.
2. Culms branched.
  3. Spikelets either axillary and sessile or terminal on lateral branches. Branches numerous, all fertile.
    4. Sheaths closely appressed. Flowering branches erect, straight. Spikelets in both sexes narrow ..... *R. fastigiatus* 1.
    - 4.\* Sheaths lax, open and spreading almost from the base. Flowering branches very often flexuose. Male spikelets ovoid, female narrow, at anthesis ..... *R. dimorphus* 2.
  - 3.\* Spikelets in a terminal panicle. Culms bearing numerous, finely divided, barren branches in whorls ..... *R. tetraphyllus* 4.
- 2.\* Culms unbranched.
  5. Culms much flattened ..... *R. complanatus* 3.
  - 5.\* Culms terete.
    6. Sheath apices either glabrous or fringed with downy hairs less than 0.25 mm. long. Spikelets few to many. Barren and flowering glumes either glabrous or the margins sparingly hairy or ciliate.
    7. Free (non-overlapping) portion of the lowest subtending bract on the axis of the inflorescence gradually tapered to an acute or obtuse apex or, if more abruptly tapered, then lax, in either case usually longer than the sheathing base and often exceeding the lowest spikelet, the whole appearing more or less lanccolate.
    8. Rhizome (4–) 5–10 mm. diam., up to 20 cm. or more in length with few branches. Culms 1–3 mm. diam., usually spaced 1–5 mm. apart on the rhizome. Female spikelets ovoid, 5–7 mm. long.

9. Free portion of the lowest subtending bract on the main axis of the inflorescence broad-lanceolate, tending to embrace the lowest spikelets. Outer surface of the sheaths and bracts rugose-muriculate. Culms up to 3 mm. diam. Stomata on the culm sunken in irregular depressions ..... *R. australis* 5.
- 9.\* †Free portion of the lowest subtending bract lanceolate to narrow-lanceolate, not tending to embrace the spikelets. Outer surface of the sheaths and bracts not rugose-muriculate. Culms 1-2 mm. diam. Stomata not or only slightly sunken..... *R. stenocoleus* 6.
- 8.\* Rhizome 3-4 (-5) mm. diam., with short crowded branches 0.5-2 cm. long, rarely longer. Culms 0.75-1.5 (-1.75) cm. diam., closely arranged on the rhizome. Female spikelets oblong-cylindrical, 6-16 mm. long ..... *R. gracilis* 8.
- 7.\* Free portion of the lowest subtending bract more or less abruptly tapered to the apex, never lax, shorter or only slightly longer than the sheathing base, only occasionally exceeding the lowest spikelet. Internodes of the axis of the inflorescence elongated.
10. Spikelets on the lower part of the inflorescence not crowded, but borne on filiform pedicels or fine branches, either of which may be several cm. long. Apices of the subtending bracts closely appressed. Flowering glumes 4-6 mm. long, the margins sometimes fringed ..... *R. longipes* 7.
- 10.\* Spikelets mostly crowded together on the branches or at the nodes of the inflorescence, the exposed portion of the pedicels not exceeding 5 mm. long. Apices of the subtending bracts often reflexed by contact with the lower spikelets. Flowering glumes 2-3.5 mm. long, the margins not fringed ..... *R. pallens* 10.
- 6.\* ††Sheaths on the upper portion of the culm mostly bearing an apical tuft of fine hairs 1-4 mm. long. Spikelets few, mostly 1-6. Barren and flowering glumes mostly fringed with long fine hairs .. *R. fimbriatus* 9.
- 1.\* Leaf blades present on some of the sheaths, small, subulate ..... *R. tenuiculmis* 11.

**1. *R. fastigiatus*** *R. Br.*, Prodr. (1810) 246; Kunth, Enum. Pl. III (1841) 418; F. Muell., Fragm. VIII (1873) 67; Benth., Fl. Austral. VII (1878) 222; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 269; Moore & Betche, Handb. Fl. N.S.W. (1893) 443; Maiden & Betehe, Census N.S.W. Pl. (1916) 37; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 486. Rhizome creeping, short, densely woolly-hairy, partly overlaid with scarios scales. Culms erect, terete, 30-100 cm. high, 1-2 mm. diam., divided in the upper portion into numerous erect, slender, straight, flowering branches; sheaths closely appressed, obtuse, distant, dark brown, 0.5-2 cm. long. Spikelets numerous, narrow, 4-6 mm. long, terminal or sessile along the branches, solitary in the axils of the subtending bracts; bracts sometimes nearly as long as the spikelets. Male spikelets several-flowered, ellipsoid-cylindrical; glumes mucronate, especially the outer ones. Male flowers: tepals 6, linear, nearly equal; stamens 3. Female spikelets 1-flowered, narrower than in the male, some of the barren glumes with a long mucronate tip. Female flowers: tepals 6, broader than in the male, closely imbricate, enveloping each other and also the ovary, the

†Hybrid forms with *R. fimbriatus* (p. 22) may also key out here.

††Hybrid forms with *R. stenocoleus* may also key out here.

three inner ones shorter than the outer; staminodes 3, minute; ovary 2-locular, style-branches 2. Capsule opening at the margins. Seeds ellipsoid, greyish, striate, ca. 2 mm. long. Chromosome number:  $2n = 14$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). *Calorophus sieberanus* Steud., Syn. Glum. II (1855) 265 ("sieberianus").

Central and South Coast as far south as Milton, and eastern parts of the Central and Southern Tablelands, in sandy, usually shallow soils, often poorly drained or in successional stages over sandstone rock surfaces. 11 miles N of Gosper's (Uraterer) Mtn. airstrip, E of Glen Alice, Rodd & McGillivray 4.1965 (74301); near Woy Woy, ("Wye Wye"), Deane 9.1884 (60886); Mt. White, Peat's Ferry to Gosford road, Robertson 11.1948 (7310); Blue Mountains, Betche 6.1883 (47829); Mt. Wilson, Gregson 9.1901 (47825); Blackheath, Hamilton 9.1914 (47827, 48894); Blackheath, Vickery 9.1936 (47826); Blackheath, Constable 1.1950 (11345); Blackheath, Constable 10.1957 (43145); Medlow, Hamilton 11.1914 (47828); Linden, Constable 2.1948 (7583); Berowra, Salasoo No. 727, 8.1951 (47808); Ku-ring-gai Chase, Goode No. 40, 10.1954 (47809); between Pittwater and Terrey Hills, Goode No. 288, 1.1955 (47811); Terrey Hills, Tindale 8.1961 (56836); Terrey Hills, Briggs 4.1962 (57117); Belrose, Johnson 10.1946 (47810); Hornsby, Blakely 9.1916 (47812); Killara, Blakely & McKie 4.1937 (47813); Curl Curl, Deane 9.1884 (60881); Manly Water Reserve, Briggs and Johnson 1.1962 (56882); North Head, Port Jackson, Briggs 1.1962 (60722); Dobroyd Pt., Balgowlah, Port Jackson, Johnson 8.1951 (47814, 47815); Port Jackson, Brown 1802-5 (BM) male, HOΛOΤΥΠE, seen; Port Jackson district, Betche 10.1894 (47816, 47818, 48893); Port Jackson, Forsyth 9.1900 (47817); Centennial Park, Sydney, Cheel 7.1899 (47819); Cronulla, Rodway 8.1933 (60808); Audley to Wattamolla, National Park, Goode No. 432, 10.1961 (60208); Uloomla Track, National Park, Johnson 7.1946 (47820); Waterfall, Maiden 8.1906 (47821); Woolwash, SE of Campbelltown, McBarron No. 6824, 2.1962 (60894); Loddon R., Appin to Bulli road, McBarron No. 7148, 7151, 4.1962 (57102, 57103); West Dapto, Cambage No. 413, 6.1901 (47822); Jervis Bay, Rodway 3.1919 (60803); Naval College Road, Jervis Bay, Rodway 9.1928 (60804), 4.1930 (60809); Sassafras, Rodway 5.1935 (47823); Sassafras Falls, Nowra to Braidwood road, Rodway 5.1935 (60805); Mt. Endrick, Budawang Range 30 miles S of Nowra, Rodway 5.1945 (60806); Pigeon House Mtn., SW of Milton, Cambage 7.1915 (47824); 15 miles S of Nerriga, Rodway 10.1937 (60807).

Also recorded from southern Queensland by Blake in Proc. Roy. Soc. Queensl. LXXIII (1963) 77. The species may yet be found in the intervening sandy areas on the North Coast of New South Wales.

As pointed out by Bentham, the name *R. lateriflorus* R. Br. was erroneously used for this species by Nees in determinations of Sieber's specimens and "*R. lateriflorus* Nees" was incorrectly referred by Sprengel, Syst. Veg. IV, Pt. 2, Cur. Post. (1827) 26, to *R. tropicus* R. Br.

**2. *R. dimorphus* R. Br.**, Prodr. (1810) 246; Kunth, Enum. Pl. III (1841) 418; F. Muell., Fragm. VIII (1873) 68; Benth., Fl. Austral. VII (1878) 224; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 270; Moore & Betche, Handb. Fl. N.S.W. (1893) 443; F. M. Bail., Qld. Fl. VI (1902) 1723, excl. Queensland specimens; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 486. Rhizome creeping, densely woolly-hairy when young, partly overlaid with scarios scales. Culms slender, diffuse, 30-100 cm. long, ca. 1 mm. diam., more or less branched in the upper portion; branches thin and wiry, very often flexuose, all floriferous; sheaths loose, open almost from the base, rather broad, apically rounded and mucronulate, usually not exceeding 1 cm. long; bracts shorter than the spikelets. Male spikelets numerous, ovoid to globose, each sessile or nearly so in the axil of the bract, distant along the branches or terminal, 4-5 mm. long, each containing 3-8 flowers; outer barren glumes broad, acuminate. Male flowers: tepals 6; stamens 3. Female spikelets fewer, 1-flowered, sessile, distant or terminal, 5-6 mm. long, the outer barren glumes with long points. Female flowers: tepals 6; staminodes 3, minute; ovary 2-locular; style-branches 2. Capsule flattened, often 1-seeded and oblique by abortion of one loculus; seed ellipsoid, greyish, striate, ca. 1.5 mm. long. Chromosome number:  $2n = 14$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. September-October.

Central Coast, on sandstone in shallow soils and around rocks. Woy Woy, Deane 9.1884 (60885); Wondabyne, Constable 10.1960 (52254);  $\frac{1}{2}$  mile E of Cowan, McBarron No. 8952, 3.1964 (65818); N of Terrey Hills, Constable 9.1958 (46206, 48845); between Pittwater and Terrey Hills, Goode 1955 (47851); Terrey Hills, Briggs 4.1962 (57116); Belrose, Johnson 10.1946 (47852); Manly Water Reserve, Briggs & Johnson 1.1962 (60690); Curl Curl, Deane 11.1884 (60887); Freshwater, Manly, Hamilton 10.1916 (47853, 48844); North Head, Port Jackson, Collic 8.1889 (65783); North Head, Port Jackson, Briggs 1.1962 (60689); Northbridge Golf Course, Briggs & Johnson 1.1962 (56881); North Sydney, Cleland 1.1912 (47854); Port Jackson, Brown 1802-5 (BM) male and female SYNTYPES, seen; Port Jackson district, Betche 10.1894 (47862); Port Jackson district, 10.1896 (47857); Port Jackson district, Forsyth 9.1900 (47855); Port Jackson district, Boorman 4.1906 (52255, 52256); Bondi, Hamilton 10.1916 (47860); Williams Park, North Bondi, Johnson 5.1951 (47859); Williams Park, North Bondi, Evans & Constable 6.1960 (52259); Bellevue Hill, Helms 8.1900 (57855); Cooper Park, Bellvue Hill, Johnson 1948 (47858); Waverley, Camfield 11.1896 (52252, 52253); Centennial Park, Cheel 9.1899 (47861, 48688); Woronora R., Fletcher 10.1894 (54116); National Park, Audley to Wattamolla, Goode 10.1961 (60207); Uloola Track, National Park, Johnson 7.1946 (47863); Waterfall, Maiden 8.1906 (52257); George's R., East Minto, McBarron 2.1962 (57101), 3.1962 (57100); George's R., E of Leumeah, Johnson 11.1948 (47864); Woolwash, E of Campbelltown, McBarron 2.1962 (60894); near Helensburgh, Whaita 8.1952 (47865); Cataract Dam, Maiden 9.1908 (47866).

*R. dimorphus* is recorded for Queensland by Benthams, Bailey and Domin. However, these records are based on misdeterminations of *Coleocarya gracilis* S. T. Blake.

Records of multiple flowers in female spikelets or of a 3-locular ovary may have resulted from observations on specimens affected by a pathogenic fungus, probably *Tolyposporium* sp.

**3. *R. complanatus* R. Br.**, Prodr. (1810) 245; Kunth, Enum. Pl. III (1841) 416; Hook. f., Fl. Tas. II (1860) 71; F. Muell., Fragm. VIII (1873) 67; Benth., Fl. Austral. VII (1878) 228; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 256; Moore & Betche, Handb. Fl. N.S.W. (1893) 443; F. M. Bail., Qld. Fl. VI (1902) 1723; Rodway, Tas. Fl. (1903) 236; Domin in Bibl. Bot. XX (1915) 505; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Ewart, Fl. Vic. (1931) 256; Black, Fl. S. Austral. ed. 2, I (1943) 173; J. H. Willis, Handb. Pl. Vic. (1962) 274; Beadle Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 485. Rhizome short, much branched, densely tufted, more or less woolly-hairy under the broad scales. Culms erect, simple, much flattened, finely striate, 30-100 cm. high, 1-5 mm. wide; sheaths closely appressed, thin, obtuse, pale, distant, 1-2.5 cm. long; bracts shorter than the spikelets. Spikelets in both sexes mostly 10-20, arranged in a narrow panicle. Male spikelets many-flowered, narrow-ovoid, 5-6 mm. long, on filiform pedicels; glumes shortly acuminate. Male flowers shortly stipitate within the glume; tepals 4; stamens 3. Female spikelets with fewer flowers, oblong-ovoid, up to 10 mm. long; glumes acuminate with a long fine point. Female flowers: tepals 4; staminodes 2; ovary 2-locular; style-branches 2. Capsule flattened, 2-locular, opening along the margins; seed ellipsoid, pale brown, smooth, ca. 1.5 mm. long. Chromosome number:  $2n = 24$ , (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. October-November.

Coast and eastern part of the Central Tablelands, on sandy or peaty, poorly drained soils, usually in heathy country. Barcoongere State Forest, near Corindi, Floyd 9.1959 (47909); Coff's Harbour, Boorman 6.1911 (47910); Bonny Hills, Camden Haven, Constable 5.1964 (64742); Myall Lakes, Osborn 9.1935 (47911); Nelson Bay to Williamstown, Evans 12.1961 (59929); Peat's Ferry to Gosford road, Vickery 11.1936 (47912); Railway Water Reserve, Newnes Junction, Constable 8.1953 (25755); Salvation Creek, 6 miles S of Commodore Heights, Ku-ring-gai Chase, Johnson 4.1951 (19526); McCarr's Creek, Ku-ring-gai Chase, Johnson 12.1952 (21343); Terrey Hills, Briggs 5.1962 (61058); 1 mile E of Killara Rly. Stn., Blakely 7.1937 (47913); North Head, Port Jackson, Briggs 11.1961 (56838); Castlecove, Sydney, Tindale 10.1951 (18245); near Sydney, Betche 12.1881 (47915); Port Jackson, Brown 1802-5 (BM), male, SYNTYPE, seen; Port Jackson district, ex Herb. Woolls, before 1890 (47914); Port Jackson district, Boorman 4.1906 (47916); Five Dock, Deane 10.1884 (60883); Bondi, Deane 12.1884 (60884); Centennial Park, Sydney, Forsyth 10.1894 (47918), 12.1896 (47917); La Perouse, Botany Bay, Evans & Constable 12.1959 (57114, 57115); Kogarah, Camfield 11.1902 (47919, 47920); Kurnell, Johnson 8.1946 (47921); National Park, Rodway 10.1934 (60787); Plateau W of Scarborough, Johnson 4.1953 (47922); Loddon River, McBarron 4.1962 (57099); W of Austinmer, Rodway 7.1933 (60788); 5 miles SE of Robertson, Rodway 4.1944 (60790); 10 miles SE of Robertson, Rodway 10.1943

(60789); Jamberoo to Carrington Falls road, Constable 1.1953 (32237); The Barren Ground, W of Kiama, Chadwick 4.1957 (47923); The Barren Ground, Constable 2.1959 (53959); S of Cambewarra Pass, Rodway 9.1936 (60791); Currarong, Vickery 4.1961 (55204); Point Perpendicular, Jervis Bay, Rodway 5.1920 (60792); Point Perpendicular, Constable 6.1960 (56654); Moonie Creek, Jervis Bay, Rodway 12.1923 (60793); near Pacific City, Jervis Bay, Rodway 2.1931 (60794); Bowen Island, Jervis Bay, Rodway 4.1920 (60795); Ball's Creek, 10 miles S of Eden, Constable 6.1960 (53965). Also in southern Queensland, Victoria and Tasmania.

4. *R. tetraphyllus* Labill., Pl. Nov. Holl. II (1806) 77, t. 226, 227; R. Br., Prodr. (1810) 247; Kunth, Enum. Pl. III (1841) 420; Hook. f., Fl. Tas. II (1857) 71; F. Muell., Fragm. VIII (1873) 66; Benth., Fl. Austral. VII (1878) 228; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 270; Moore & Betche, Handb. Fl. N.S.W. (1893) 442; F. M. Bail., Queensl. Fl. VI (1902) 1723; Domin in Bibl. Bot. XX (1915) 504; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Ewart, Fl. Vic. (1931) 256; Black, Fl. S. Austral., cd. 2, I (1943) 173; J. H. Willis, Handb. Pl. Vic. (1962) 273; L. Johnson & O. Evans in Contrib. N.S.W. Nat. Herb. III (1963) 218; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 485. Rhizome creeping, short, up to 1 cm. diam., densely woolly-hairy with a further partial covering of short, broad, scarious scales. Culms erect, 50–150 cm. high, 3–5 mm. diam., bearing in the upper portion dense clusters of repeatedly branched, filiform, sterile, assimilatory branches; sheaths closely appressed, 2–3 cm. long. Spikelets varying from few to 400, on filiform peduncles in a narrow loose panicle. Male spikelets ovoid to globular, 2.5–7 mm. long; flowering glumes 1.5–4 mm. long, ovate, mucronate or aristate. Male flowers: tepals 6. Female spikelets ellipsoid to shortly cylindrical, often acute at the apex, 4–10 mm. long; flowering glumes ovate-acuminate, aristate, 2.5–5.5 mm. long. Female flowers: tepals 4; staminodes 2; ovary 2-locular, flat; style-branches 2. Capsule small, opening along the margins or irregularly. In juvenile shoots leaf laminae up to 1.5 cm. long may be developed.

This species may be divided into two geographic subspecies, which are readily distinguishable in fertile material of either sex. At present these two races are not known to come in contact and no intergradation is known.

1. Female spikelets in the flowering stage 5–10 mm. long; flowering glumes 3.5–5 mm. long. Male spikelets 5–7 mm. long; glumes 2–4 mm. long . . . . ssp. *tetraphyllus*.
- 1.\* Female spikelets in the flowering stage 4–5 mm. long; glumes 2–3 mm. long. Male spikelets 2.5–3 mm. long; glumes 1.5–2 mm. long . . . . . ssp. *meiostachyus*.

ssp. *tetraphyllus*. Spikelets 20–200, arranged in a terminal panicle. Male spikelets 5–7 mm. long; flowering glumes 2–4 mm. long. Female spikelets 5–10 mm. long; glumes 3.5–5 mm. long. Chromosome number:  $2n = 22$  (Briggs in Contrib. N.S.W. Nat. Herb. IV (1966) 25). Fl. mid-summer.

Far South Coast, in swampy places and on river banks. Murrica R., Disaster Bay, Constable 10.1954 (30875); Green Cape road, near Disaster Bay, Constable 6.1960 (52519). Also in Victoria, South Australia and Tasmania.

The internodes of the sterile assimilatory branches often exceed 2 cm., which is much longer than is usually the case in the following subspecies.

ssp. *meiostachyus* L. Johnson et O. Evans in Contrib. N.S.W. Nat. Herb. III (1963) 220. Spikelets usually 200–400 in the panicle. Male spikelets 2.5–3 mm. long; flowering glumes 1.5–2 mm. long. Female spikelets 4–5 mm. long; flowering glumes 2–3 mm. long. Chromosome number:  $2n = 22$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. December.

North, Central and South Coast as far as Milton district, in deep moist sandy soils and "paperbark" (*Melaleuca*) swamp forests, with an outlying occurrence in the Timbarra area on

the north-eastern edge of the Northern Tablelands. Cudgen, McKee No. 9534, 7.1962 (57941); Murwillumbah district, 1949 (47934); Byron Bay, Maiden & Boorman 11.1903 (47935); Clarence R., Wilcox 1872 (MEL); Sandy Creek, Upper Clarence R. district, Stuart No. 837 (MEL); Timbarra, Upper Clarence R. district, Stuart No. 839 (MEL); Barcoongere State Forest, N of Corindi, Floyd 9.1959 (47536); Hat Head, Constable 1.1953 (22071, 48995); Hat Head, Ingram 1.1961 (53509, 53782); Hastings R., Beckler (MEL); Kendall district, Bailey 9.1932 (47937); Forster, Gilbert 11.1946 (47938); Bombah Point, Myall Lakes, Constable 1.1952 (19831); Bombah Point, Myall Lakes, Briggs 8.1964 (64723); Shoal Bay, Port Stephens, Johnson 2.1947 (4941); near Anna Bay, Johnson & Briggs 1.1962 (60653); Williamtown-Nelson Bay, Evans 12.1961 (59930); Belmont, Dwyer 3.1920 (47939); Tuggerah, Boorman 10.1900 (47940); Cowan Creek, Fitzgerald 8.1873 (MEL); Dee Why, Carnic 11.1914 (47941); Dee Why, Evans 2.1926 (SYD); Dee Why Lagoon, Evans & Constable 12.1960 (52852, 52853); Dec Why Lagoon, Johnson 9.1961 (56884); Dee Why Lagoon, Briggs & Johnson 1.1962 (56877); Port Jackson district, Boorman 1.1908 (47942); Randwick, Wilhelmi 11.1863 (MEL); Centennial Park, Sydney, Forsyth 11.1896 (47943); Botany Bay, Banks & Solander 1770 (65820); Botany Bay, Boorman 1.1908 (50802); Botany Bay, Deane 6.1884 (60882); Botany Bay, Dixon 7.1903 (47944); Ramsgate Park, Botany Bay, Camfield 11.1902 (47945); Woodhill Bluff, Berry, Rodway 8.1949 (53120); Berry, McBarron No. 5269, 11.1950 (47946); Currarong, Jervis Bay, Rodway No. 9415, 1.1926 (49706); Currarong, Jervis Bay, Briggs 12.1963 (67588, 67589); Jervis Bay, Maiden 7.1899 (47947); Conjola, Heron 11.1898 (47948); Narrawallee, Milton, Cambage 12.1911 (47949, 48996; SYD). For further records see Johnson & Evans, loc. cit. Also in Queensland.

The subspecies should be further sought in the Timbarra district, where it has not been collected for almost a century, and where recent search has been unsuccessful.

The internodes of the sterile assimilatory branchlets are very short except in specimens grown in sheltered situations (or in young plants), in contrast to the condition in ssp. *tetraphyllus*.

**5. *R. australis* R. Br.**, Prodr. (1810) 245; Kunth, Enum. Pl. III (1841) 415; Hook. f., Fl. Tas. II (1857) 71; F. Muell., Fragm. VIII (1873) 69; Benth., Fl. Austral. VII (1878) 227; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 254; Moore & Betche, Handb. Fl. N.S.W. (1893) 443; Rodway, Tas. Fl. (1903) 236; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Ewart, Fl. Vic. 1931 (256); J. H. Willis, Handb. Pl. Vic. (1962) 274; L. Johnson & O. Evans in Contrib. N.S.W. Nat. Herb. III (1963) 202; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 486. Rhizome creeping, short, woolly-hairy, partly covered with broad scarios scales, 4–10 mm. diam. over all. Culms erect, unbranched, 50–100 cm. tall, 1.5–3 mm. diam. Sheaths 1–3 cm. long, obtuse or acute, lax on the upper portion of the culm, appressed on the lower portions. Principal subtending bracts on the axis of the inflorescence appearing broad-lanceolate to lanceolate, 1.5–3 cm. long, 4–7 mm. wide, acute or obtuse, often longer than the spikelets and embracing them, glabrous, the outer surface together with that of the sheaths striate and rugose-muriculate. Stomata sunken. Spikelets 2–15, rarely 1 only, shortly pedicellate, arranged in a raceme or a narrow panicle, the whole 2–6 cm. long; spikelets of both sexes similar in shape, ovoid, 5–10 mm. long. Outer barren glumes of the spikelet usually slightly fringed with hairs; flowering glumes 4–6 mm. long, ovate to lanceolate, with a long fine point; margins sometimes fringed. Male flowers: tepals 6. Female flowers: tepals 4; staminodes 2; ovary 2-locular, flat; style-branches 2, free from near the base. Capsule opening along the margins; seed ellipsoid, brown, smooth, ca. 0.8 mm. long. Chromosome number:  $2n = 24$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. December-February. See Fig. 3 on p. 11.

Central and Southern Tablelands and Snowy Mountains in wet peaty, sandy or gravelly soil, also in *Sphagnum* bogs. Running Stream, Ilford to Capertee, Constable 6.1961 (55198); Mt. Cameron, Newnes district, Constable 12.1948 (7281); Annie Rowan Creek, 12 miles N of Newnes Junction, Constable 7.1960 (55880); Newnes Junction to Eskbank, Hamilton 11.1914 (47836); Newnes Junction, Constable 2.1961 (58319); Mt. Wilson, Maiden 4.1896 (47835); Mt. Wilson, Gregson 12.1897 (47834); Mt. Victoria, Cheel 12.1900 (47837); Blackheath, Constable 2.1962 (57029); Blackheath, Evans 12.1961 (56898); Medlow Bath, Hamilton 11.1914 (47838); Katoomba, Constable 12.1959 (53966); Minnehaha Falls, Katoomba, Constable 1.1961 (53267), 1.1962 (60800); Leura-Mt. Hay road, Constable 8.1964 (64784); The Lake, Wentworth Falls, Evans & Blaxell 11.1961 (56433); Roly Whalan's Swamp, The Body Platcau, 5 miles NW



of Kanangra Tops, Johnson 10.1948 (47839); Boyd R., near Kanangra Walls, Briggs 4.1963 (67564); The Big Plain, E of Mt. Werong, Cabbage No. 3173, 12.1911 (47840, 48848; SYD); Mt. Werong, Constable 11.1962 (63101); Braidwood district, Bäuerlen 12.1884 (MEL); Clyde Mountain, Constable 3.1961 (53505); Clyde Mountain, Briggs 12.1961 (56869); Clyde Mountain, Phillips No. 818, 4.1961 (56311); head of Murray's Gap, Bimberi Ra., Schodde No. 1305, 2.1961 (63145); Upper Peppercorn Creek, 40 miles SW of Canberra, Walker 12.1962 (66336; ANU 955); Mt. Gingera, McKee 2.1963 (63146); Gudgenby, Cabbage No. 3409, 1.1912 (19859); Kiandra, Betche 2.1897 (47842); Happy Jack's Plain, head of Tunut R., Newman 1.1952 (52875); Happy Jack's Creek, Johnson 3.1964 (64420); Smiggin Holes, Mt. Kosciusko, Johnson & Constable 1.1951 (19337); Boggy Plains, Kosciusko Area, Costin 2.1962 (57042); 12 miles NE of Nimmitabel, Briggs 3.1962 (57026). For further records see Johnson & Evans, loc. cit. Also in Victoria and Tasmania.

6. *R. stenocoleus* L. Johnson et O. Evans in Contrib. N.S.W. Nat. Herb. III (1963) 205. Rhizome creeping, short, woolly-hairy, partly covered with broad scarious scales, 4–8 mm. diam. over all. Culms erect, unbranched, 50–150 cm. tall, 1–2 mm. diam.; sheaths all closely appressed, 1–2.5 cm. long, glabrous or the margins ciliate, acute or obtuse. Lowest subtending bract of the inflorescence erect, 1–2 cm. long, 1.5–3 (–4) mm. wide, tapered gradually to the apex, sometimes longer than the lowest spikelet. Spikelets 4–10, mostly on short filiform pedicels, the exposed parts of which do not exceed 1 cm. in length, and arranged in a very narrow panicle or a raceme mostly 2–5 cm. long. Male spikelets globose at anthesis, 5–7 mm. long. Female spikelets ovoid to ellipsoid, 5–8 mm. long, 4–5 mm. diam. Outer, barren glumes of the female spikelet often fringed with fine hairs; flowering glumes 4–5 mm. long, ovate, aristulate, the margins sometimes fringed. Male flowers: tepals 6. Female flowers: tepals 4; staminodes 2; ovary 2-locular, flat; style branches 2, free from near the base. Capsule opening along the margins. Seeds dark brown, ellipsoid, 0.75 mm. long. Chromosome number:  $2n = 22$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229. Fl. January-February. See Fig. 2 on p. 12.

Northern Tablelands, on the margins of swamps in acid soils. Carrol's Creek, 17 miles NE of Tenterfield, Constable 3.1962 (57731); 12 miles NE of Tenterfield, Constable 5.1961 (55190); Timbarra to Surface Hill road, Constable 5.1961 (55193); near Torrington, Boorman 1.1911 (52871); 5 miles NW of Torrington, Briggs 8.1964 (64875); Deepwater R., ca. 3 miles E of Deepwater, Constable 5.1961 (55188); Gibraltar Range, 43 miles E of Glen Innes, Constable 5.1961 (55186); Ryanda, 9 miles N of Guyra, McKie No. 2468, 12.1946 (BRI 024651); Guyra, McKie No. 314, 3.1930 (47904); Parlour Mts. near Booroolong, Gray 1.1956 (47894); Bald Hills Station, Grafton to Armidale, Maiden 12.1893 (47905); Dirty Creek, 1½ miles E of Ebor, Johnson & Briggs (60640, 60642); Bullock Creek, near junction of Point Lookout road, Ebor-Armidale, Williams 2.1961 (53479, 53480), 2.1962 (60870); Walcha district, Crawford 6.1900 (49707); Niangala district, ca. 30 miles SE of Tamworth, 2.1963 (63148); Gloucester Tops, Briggs 4.1962 (57090); Gloucester Tops, Evans & Burgess 5.1962 (61054, 61055, 61056, 61057); Beean Beean Plain, Barrington Tops, Burgess 6.1962 (61207, 61669); ¼ mile W of Carey's Peak, Barrington Tops, Briggs 10.1961 (56162). For further records see Johnson & Evans, loc. cit. Also in southern Queensland.

Probable hybrids between this species and *R. fimbriatus* are discussed under the latter *R. stenocoleus* replaces *R. australis* on the New England Tableland and Barrington Tops. As well as in the characters given above, it differs from *R. australis* in the superficial stomates. Material of *R. stenacaleus* was included under *R. gracilis* by Bentham and other authors (see references under that species). The population on Barrington Tops differs somewhat in having thicker culms, broader bracts and the stomates somewhat sunken in individual pits, and shows some resemblance to *R. australis*. The Gloucester Top plants, however, are closer to typical *R. stenocoleus*. The chromosome number in both these areas has been determined as  $2n = 22$ , as in *R. stenocoleus* from New England (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229), whereas in *R. australis*  $2n = 24$ . Atypical plants with shorter bracts are found east of Wyberba, Queensland, just over the New South Wales border, and similar forms may occur in this State. The various atypical forms are discussed more fully by Johnson & Evans, loc. cit.

7. *R. longipes* L. Johnson et O. Evans in Contrib. N.S.W. Nat. Herb. III (1963) 208. Rhizome creeping, short, densely woolly-hairy with a further partial covering of broad scarious scales, 0.5–10 mm. diam. over all. Culms erect, usually un-

branched, up to 150 cm. tall, 1–3 mm. diam.; sheaths 1.5–3 cm. long, striate, obtuse, very closely appressed. Lowest subtending bract of the inflorescence closely appressed, erect, shorter than the lowest spikelet, finely striate but not rugose-muriculate. Spikelets 6–25, on filiform pedicels, arranged in a loose raceme or narrow panicle up to 25 cm. long. Male spikelets ovoid, 6–7 mm. long; flowering glumes ovate-acuminate, aristulate, 3–4 mm. long, the margins fringed with fine hairs. Female spikelets ellipsoid, 6–8 mm. long; outer, barren glumes glabrous or fringed with fine short hairs; flowering glumes ovate to elliptical, aristulate, 4–6 mm. long, the margins sometimes fringed. Male flowers: tepals 6, the 2 outer conduplicate. Female flowers: tepals 4; staminodes 2; ovary 2-locular, flat; style-branches 2, free almost from the base. Capsule not seen. Chromosome number:  $2n = 22$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. January-February. See Fig. 3 on p. 12.

Southern Tablelands: Clyde Mountain, in a swamp near the road at the summit of the Pass on the Braidwood to Nelligen road. Clyde Mtn., Moore 9.1952 (47841); Clyde Mtn., Constable 3.1961 (53506); Clyde Mtn., Phillips 4.1961 (55207); Clyde Mtn., Briggs 12.1961 (60639, 60642); Clyde Mtn., Heyligers No. 28, 12.1963 (64682).

Search should be made for *R. longipes* in other localities along the eastern edge of the Southern Tablelands. At its single known site it grows with *R. australis* although mostly in deeper water than the latter. Some instances of branching have been observed in barren culms only. No hybrids have been found. Since the revision by Johnson & Evans, loc. cit., male plants have been discovered in the single known population (64682).

**8. *R. gracilis*** *R. Br.*, Prodr. (1810) 245; Kunth, Enum. Pl. III (1841) 416; F. Muell., Fragm. VIII (1873) 69; Benth., Fl. Austral. VII (1878) 227; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 259; Moore & Betche, Handb. Fl. N.S.W. (1893) 443; Domin in Bibl. Bot. XX (1915) 505; Maiden & Betche, Census N.S.W. Pl. (1916) 37; L. Johnson & O. Evans in Contrib. N.S.W. Nat. Herb. III (1963) 209; Beadle, Evans & Carolin, Handb. Vase. Pl. Syd. Dist. (1963) 486. Rhizome creeping, short, often densely branched and tufted, covered with closely appressed scarios scales and near the apex of growth densely woolly-hairy beneath and between the scales; diameter over all 3–5 mm. Culms erect, unbranched, 50–100 cm. high, 1–1.75 mm. diam.; sheaths appressed, obtuse, glabrous, 1–2 cm. long. Subtending bracts of the inflorescence erect, tapering gradually to the apex, 1–2 cm. long, 2–4 mm. wide, often exceeding the lowest spikelet. Spikelets 2–10, occasionally more numerous, rarely solitary and terminal, usually arranged in a raceme or a narrow panicle. Male spikelets ellipsoid to globose, 5–10 mm. long, usually on filiform pedicels. Male flowers: tepals 6; stamens 3. Female spikelets oblong-cylindrical, rarely ovate, 6–16 mm. long, mostly shortly pedicellate or nearly sessile. Flowering glumes in both sexes elliptical to narrow-lanceolate, aristate, mostly tapering gradually to the awn, 4–8 mm. long, glabrous or bearing a few fine marginal hairs. Female flowers: tepals 4; staminodes 2; ovary flat, 2-locular; style-branches 2. Capsule opening along the margins. Chromosome number:  $2n = 22$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. December-January. See Fig. 2 on p. 11.

Central coast, northern part of the South Coast and south-eastern part of the Central Tablelands, in wet and poorly drained, deep, sandy or peaty soils. SW of Gosford, Evans 12.1961 (59925, 59926); Woy Woy, Deane 11.1884 (52126); S of Salvation Creek, Ku-ring-gai Chase, Evans 12.1963 (66783, 66784); Curl Curl, Deane 12.1884 (52149); Port Jackson, Brown 1802-5 (BM), female, HOLOTYPE, seen; Bondi, Deane 12.1884 (52150); Centennial Park, Forsyth 10.1896 (47896, 48977); La Perouse, Botany Bay, Camfield 10.1898 (50358); Sutherland, Camfield 11.1893 (47897, 47898); Woronora R., Fletcher 10.1894 (52121); Waterfall, Mair & Constable 11.1950 (16462); National Park, Evans & Blaxell 4.1960 (52152); Madden's Plains, Evans & Blaxell 4.1960 (52153); N of Sublime Point, Rodway 7.1935 (52155); near top of Bulli Pass, Evans & Blaxell 5.1961 (55185); near Loddon Falls, Evans & Blaxell 5.1961 (54119); Pieton Lakes, McBarron No. 8756, 1.1964 (65817); Cordeaux Dam road, Mair & Constable 11.1950 (16464); Mt. Ousley, near Wollongong, McBarron No. 4073, 11.1949 (BRI);  $\frac{1}{2}$  mile N of Thirlmere, Constable 1.1961 (53266); Hill Top, Maiden 1.1896 (49700);  $9\frac{1}{2}$  miles NW of

Mittagong on Wombeyan Caves road, Constable 1.1961 (53273, 53276); Cambewarra Range, Rodway 5.1941 (49785); Jervis Bay, Rodway 1.1928 (49784); Cape St. George, S of Jervis Bay, Rodway 12.1941 (49783); Tianjara Falls, Pigeon House Range, Briggs 12.1961 (56867, 60697, 60698); 1 mile SW of Tianjara Falls, Pigeon House Range, Briggs 12.1961 (56868). For further records see Johnson & Evans, loc. cit.

Several specimens from Tianjara Falls, Pigeon House Range area, are remarkable for their stout culms and broad subtending bracts; however, slender forms also occur in this area. The chromosome count was made on one of the latter.

As used by Bentham and most other authors cited, but not by Robert Brown, "*R. gracilis*" included various other species. *R. stenocoleus*, *R. fimbriatus* and *R. pallens* are the chief of these, but material of *R. tenuiculmis* and *R. longipes* has also been confused with *R. gracilis*. Due to this enlarged concept there has at times also been some doubt regarding the limits of *R. gracilis* sens. lat. and *R. australis*. In fact these species are all clearly separable, although there is some apparent hybridism in the case of *R. fimbriatus* and *R. stenocoleus*.

**9. *R. fimbriatus*** *L. Johnson et O. Evans* in *Contrib. N.S.W. Nat. Herb. III* (1963) 210. Rhizome creeping, short, covered with closely appressed, glabrous, scarious, brown scales, occasionally with some woolly hairs showing from beneath; diameter 2–5 mm. over all. Culms erect, numerous, thin and wiry, unbranched, 20–80 cm. high, 0.75–1.5 mm. diam. near the base; sheaths closely appressed, 1–2 cm. long, each usually bearing an apical tuft of fine whitish hairs 1–4 mm. long, those near the base excepted. Subtending bracts of the inflorescence usually much shorter than the spikelets, all except the uppermost closely appressed in a similar manner to the sheaths on the stem. Male and female inflorescences and spikelets very similar. Spikelets usually 1 to 6, rarely more, arranged in a raceme or a narrow panicle, or terminal when solitary; individual spikelets either sessile or borne on filiform pedicels, variable in shape from ovate (with acute or obtuse apices) to globose, 4–7 mm. long. Flowering glumes 2.5–4 mm. long, ovate to elliptical, with a mucronate or aristulate apex, the margins fringed with short or long hairs. Male flowers: tepals 6; stamens 3. Female flowers: tepals 4; staminodes 2; ovary 2-locular; style-branches 2, free almost from the base. Capsule flat, 2-celled, opening at the edges; seed ellipsoid, smooth, brown, ca. 0.8 mm. long. Chromosome number:  $2n = 22$  (Briggs in *Contrib. N.S.W. Nat. Herb. III* (1963) 229). Fl. January–February. See Fig. 1 on p. 11.

Northern Tablelands, eastern parts of the Central Tablelands to the north-eastern part of the Southern Tablelands, also in a few localities on the Central and South Coast, in wet and poorly drained, deep, sandy soils. Torrington to Tungsten road, Constable 3.1962 (57024, 57025); Gibraltar Range, Green 11.1960 (60895); Gibraltar Range, Constable 5.1961 (55189, 55881); Gibraltar Range, 43 mile peg on Glen Innes to Grafton road, Constable 3.1962 (57084); Mellong Swamp, near 48 mile peg on Windsor to Singleton road, Evans & Blaxell 12.1960 (53082, 53083); Mellong Range, 41 miles from Windsor on Singleton road, Johnson 5.1962 (57111, 57112); Mellong Range, N of Grassy Hill, Johnson 4.1953 (47895); Mt. Victoria, Cheel 12.1900 (47876); Shipley, Blackheath, Constable 2.1962 (57027, 57028); Katoomba, Hamilton 12.1902 (47877); Katoomba, Johnson & Briggs 5.1962 (57113); Minnehaha Falls, Katoomba, Constable 3.1962 (57078); King's Tableland, Wentworth Falls, Forsyth 11.1898 (47880); The Lake, Wentworth Falls, Constable 1.1961 (53214, 53215); Wentworth Falls, Constable 3.1962 (57077); Lawson, Camfield 4.1897 (47883); Edina Falls, near Hill Top, Evans & Constable 2.1960 (49786, 49787, 53277, 53278); 9½ miles NW of Mittagong on Wombeyan Caves road, Constable 1.1961 (53217, 53218); Mittagong, Greenwood 11.1913 (47884); Mt. Jellore, Cheel 1.1902 (47885); Moss Vale to Fitzroy Falls, Rodway No. 1777, 11.1930 (49793); Fitzroy Falls, Constable 2.1960 (49789, 49790); 1 mile E of Fitzroy Falls, Johnson 4.1951 (47886); Bundanoon Creek, Constable 2.1960 (49788); Wingello, Boorman 11.1899 (47887, 47888); Barber's Creek, Tallong, Maiden 1.1898 (47890, 47891); Marulan–Tallong, Moore 9.1953 (47892); Point Perpendicular, Jervis Bay, Constable 10.1960 (53081); 2 miles SW of Nerriga, Braidwood–Nerriga road, Constable 3.1961 (54114, 54115); Charleyong–Tarago road, Moore 10.1952 (47893); Naghi State Forest, Constable 8.1963 (64753). Probably also in South Queensland (see below). For further records see Johnson & Evans loc. cit.

The recent collection (64753) from the far South Coast extends the known range considerably and suggests that *R. fimbriatus* may also occur in far eastern Victoria.

There appears to have been considerable hybridism between *R. fimbriatus* and *R. stenocoleus* in the northern part of the Northern Tablelands and the adjoining part of southern Queensland, perhaps involving introgression into populations of *R. fimbriatus*. This is discussed in Contrib. N.S.W. Nat. Herb. III (1963) 212. The following specimens are intermediate in character and in anatomical features between these two species and are probably of hybrid origin.

Northern Tablelands: Tenterfield to Boono Boono, Constable 5.1961 (55192); 9 miles NE of Tenterfield by road, Constable 5.1961 (55191); 6 miles NE of Tenterfield, Constable 3.1962 (57930); Torrington to Bismuth road, Constable 5.1961 (55187); Torrington, Boorman 1.1911 (52871); New England, Stuart (MEL). For further records see Johnson & Evans, loc. cit.

Material of *R. fimbriatus* and its hybrids was included by Bentham and others under *R. gracilis*; see references under that species.

**10. *R. pallens* R. Br.**, Prodr. (1810) 245; Kunth, Enum. Pl. III (1841) 415; L. Johnson & O. Evans in Contrib. N.S.W. Nat. Herb. III (1963) 212. Rhizome creeping, short, woolly-hairy, partly covered with pale scariosous scales; diameter ca. 6–10 mm. over all. Stems erect, unbranched, 50–100 cm. high, 2–4 mm. diam.; sheaths all appressed, glabrous, obtuse, 1–3 cm. long. Subtending bracts of the inflorescence shorter than the lowest spikelets, less than 1.2 cm. long, the apical free portion rounded or abruptly tapered, glabrous, scarcely longer than broad, sometimes reflexed. Spikelets 10–60, very shortly pedicellate or nearly sessile, arranged in a narrow, usually twice-branched panicle up to 25 cm. long; individual spikelets ellipsoid to subglobose, rarely somewhat acute at the apex, 4–6 mm. long, 3–5 mm. diam., the sexes nearly similar in shape and size before anthesis. Flowering glumes ovate to elliptical, mucronate, glabrous or rarely with a few marginal hairs, 2–3.5 mm. long. Male flowers: tepals 6; stamens 3. Female flowers: tepals 4; staminodes 2; ovary flat, 2-locular; style-branches 2. Capsule opening along the margins. Chromosome number:  $2n = 22$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. January. See Fig. 1 on p. 12.

North Coast and, rarely, Central Coast, in swampy places in sandy or peaty "wallum" country. Cudgen Lake, Tweed R. district, Constable 5.1962 (61210); Broadwater, N of Woodburn, Johnson 4.1962 (57081); Hat Head, Constable 1.1953 (22082); Hat Head, Ingram 1.1961 (53507, 53508); Bombah Point, Myall Lakes, Constable 1.1952 (19362); Shoal Bay, Port Stephens, Davis 9.1941 (49795); Nelson Bay to Williamtown, Evans 12.1961 (60206); Doyalson, Wyong to Swansea, Evans & Constable 1.1960 (49089, 49090); Richmond, Farlow 1.1907 (47833); Castlereagh to Agnes Banks road, Hawkesbury R. district, Constable 1.1961 (52868, 52869); Agnes Banks road, Constable 1.1962 (60801, 60802); Port Jackson, Brown 1802–5 (BM, male, HOLOTYPE, seen; Photograph N.S.W.). Also in southern Queensland.

This species was included by Bentham and other authors under *R. gracilis* R. Br.; see references under that species.

R. Brown's "Port Jackson" locality is to be taken in a broad sense. There is no evidence that the species has been found closer to Port Jackson than the Richmond district. *R. pallens* is an abundant species in wet "wallum" country on the North Coast. Unlike the preceding five species it is strictly a lowland plant.

**11. *R. tenuiculmis* S. T. Blake** in Contrib. N.S.W. Nat. Herb. III (1963) 198; L. Johnson & O. Evans, *ibid.* 214. Rhizome tufted, densely woolly hairy with a further partial covering of brown scariosous scales, 3–5 mm. diam. over all. Culms slender, erect, terete, 15–45 cm. tall, 0.5–0.8 mm. diam., unbranched or with few branches. Sheaths 1.0–1.5 cm. long, acute or obtuse, at least some of them with a small linear to subulate lamina up to 1.5 cm. long, with two small auricles at its base. Subtending bracts of the inflorescence similar to the sheaths on the stem, or the lamina reduced and the sheath opened out. Spikelets solitary and terminal or few in a loose raceme. Male spikelets ovoid to subglobose, ea. 4 mm. long. Male flowers: tepals 6. Female spikelets ellipsoid, tapered to the apex, 4–5 mm. long. Flowering glumes in both sexes ovate to lanceolate, acuminate, aristulate; margins ciliate. Female flowers: tepals 4; staminodes 2; ovary flat, 2-locular; style-branches 2.

Capsule opening along the margins; seed ellipsoid, brown, smooth, ea. 0.8 mm. long. Chromosome number:  $2n = 14$  (Briggs in Contrib. N.S.W. Nat. Herb. III (1963) 229). Fl. October–November.

Far North Coast in wet or damp sandy peat. Broadwater, N of Woodburn, Johnson 4.1962 (57082); Broadwater, Constable 5.1964 (64786); Wardell, 10 miles SW of Ballina, Bäuerlen 11.1893 (49702); 1 mile N of Wardell, Constable 10.1961 (56549, 56550, 60720). Also collected at Red Rock, near Corindi, Constable 5.1965, no specimen kept. Also in southern Queensland.

The species is remarkable for the occurrence of small leaf blades on some of the sheaths. Not infrequently the culms are branched; this is not usual in the *R. gracilis* complex. The chromosomes differ in number and size from those ( $2n = 22, 24$ ) found in the *R. gracilis* complex, nevertheless *R. tenuiculmis* morphologically and anatomically resembles the *R. gracilis* group more than it resembles other species with  $2n = 14$  (*R. fastigiatus* and *R. dimorphus*). *R. tenuiculmis* grows in wet "wallum", often near the much more robust *R. pallens* but tending to occupy less waterlogged sites; it is a less prominent component of the vegetation and further search may extend its known range.

### 3. LEPTOCARPUS R. Br.

Perennial, dioecious, with a hard creeping or tufted rhizome. Culms simple or branched, leafless except for the sheaths which are usually closely appressed and may bear a rudimentary lamina. Male and female inflorescences nearly similar or very dissimilar. Spikelets in both sexes with a number of flowers or, rarely, 1-flowered in the female, the latter sometimes irregularly aggregated into compound spikelets (not in N.S.W. species); glumes imbricate; bracteoles absent, or sometimes present in the female (absent in N.S.W. species). Tepals 6, rarely 5 or 4, unequal, the two exterior slightly longer and keeled. Male flowers: stamens 3, rarely 2; anthers oblong, 1-locular, attached near the base; filaments short. Female flowers: staminodia 3 and small, or absent; ovary 1-locular, triquetrous, with a single ovule; style branches 3, rarely 2. Fruit a small nut, said to open occasionally along one angle.

A small genus of about 15 species: 1 in south-east Asia, 1 in New Zealand, 1 in Chile and the remainder endemic in Australia. The African species formerly placed in *Leptocarpus* belong to *Calopsis* Beauv. ex Desv., a genus which differs markedly in pollen and anatomy and is probably not closely related.

*L. tenax* (Labill.) R. Br., Prodr. (1810) 250; Hook. f., Fl. Tas. II (1857) 73; F. Muell., Fragm. VIII (1873) 93; Benth., Fl. Austral. VII (1878) 232; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 335; Moore & Betehe, Handb. Fl. N.S.W. (1893) 444; Rodway, Tas. Fl. (1903) 235; F. M. Bail., Compr. Cat. Qld. Pl. (1912) 588; Maiden & Betehe, Census N.S.W. Pl. (1916) 37; Gardner, Enum. Pl. Austral. Occident. (1930) 16; Ewart, Fl. Vie. (1931) 257; Black, Fl. S. Austral. ed. 2, I (1943) 174; Blackall, W. Austral. Wildflowers I (1954) 55; J. H. Willis, Handb. Pl. Vic. (1962) 275; Beadle, Evans & Carolin, Handb. Vase. Pl. Syd. Dist. (1963) 486. Rhizome shortly creeping, glabrous, pale, partly covered with closely imbricate, glabrous, scarios seales, 4–7 mm. diam. over all. Culms erect, straight, mostly unbranched up to the inflorescence, smooth or very minutely striate, greyish-green due to a covering of closely appressed, scale-like trichomes, 60–100 cm. high, 1–2 mm. diam. Sheaths closely appressed, brown, striate, obtuse or sometimes acuminate with a reduced erect lamina. Male inflorescence a loose drooping terminal panicle, 5–10 cm. long, the branches and pedicels whitish when young with a minute tomentum, glabrous at maturity. Male spikelets numerous, pedicellate, several-flowered, oblong-ovoid, acute, 3–5 mm. long, ea. 1 mm. diam. Glumes dark brown, ca. 2 mm. long, imbricate, ovate, obtusely to acutely acuminate, with a mucro of variable

length and a prominent dorsal midnerve; margins membranous. Flowers flattened, ca. 2 mm. long; tepals membranous; anthers on very short filaments. Female spikelets simple, either solitary, sessile and terminal, or several to many, shortly pedicellate, in a terminal raceme or narrow panicle, erect, oblong-cylindrical, becoming turbinate, 5–15 mm. long, several-flowered. Glumes dark brown, coriaceous, acutely acuminate, 6–9 mm. long, a few outer and inner ones much shorter. Flower flattened, 2–5 mm. long; 2 outer tepals firm, acute, cymbiform, the inner ones thin, narrow and acute. Ovary oblong-linear; style-branches united for about half their length. Fruit 1–2 mm. long, narrow, pale. Chromosome number:  $2n = 22$  (see note below). *Schoenodum tenax* Labill., Nov. Holl. Pl. Spec. II (1806) 80, t. 299 (as to the female plant). For further comment on synonymy see below.

Coast, extending to eastern parts of the Central Tablelands and known from a single locality on the Northern Tablelands. In sandy soils in damp to rather dry heath, though usually with impeded drainage, also in swampy areas but not in the very wet parts. Very abundant in some places. Cudgen, McKee No. 9525, 7.1962 (57940); Byron Bay, Boorman 8.1916 (47964); 1 mile W of Byron Bay, Johnson 4.1962 (57083, 61190); near Torrington on Tungsten road, Constable 3.1962 (58142); Corindi-Red Rock road, Constable 10.1961 (66325); Coffs Harbour, Floyd 9.1959 (47965, 47988); Coffs Harbour, Hayes & Tindale 8.1961 (58136); South West Rocks, Ingram 8.1940 (55206); Hat Head, Macleay R., Constable 1.1953 (22087); Hat Head, Johnson & Briggs 1.1962 (60652); S of Port Macquarie, Tindale 8.1961 (58136); N of Booti Booti, Johnson 10.1953 (47966); Wyong to Warnervale, Salasoo No. 1630, 10.1958 (47967); Tinda Creek, Putty to Howe's Valley, Constable 3.1962 (64316); Mellong Range, Johnson 4.1953 (47968); Pittwater to Terrey Hills, Goode 1.1955 (47970); Peat's Road, Hawkesbury R. district, Deane 4.1884 (58140); Castlereagh to Agnes Banks road, SW of Richmond, Constable 11.1960 (58131, 58132), 1.1961 (61752, 61753), 6.1961 (55216); near The Lake, Wentworth Falls, Constable 1.1951 (61754, 61755); King's Tableland, Wentworth Falls, Hamilton 11.1915 (47969); Lawson, Evans & Blaxell 7.1960 (58135); Hornsby, Blakely 10.1914 (47972), 9.1916 (47971); Cheltenham, Johnson 11.1946 (47973, 47974), 11.1954 (40167, 40168); Roseville East, Johnson 4.1951 (47975); Curl Curl, Deane 9.1884 (58138, 58139); Manly Water Reserve, Briggs & Johnson 1.1962 (56880, 56883); near Sydney, Betche 1882 (47976); Port Jackson, Betche 1889 (47977); Centennial Park, Sydney, Forsyth 10.1896 (47978); Centennial Park, Checl 8.1899 (47979, 47980); South Coogee, Mair 10.1954 (58141); Malabar, Evans & Johnson 1.1962 (60691, 60692); Malabar, Gibbons 8.1964 (64751); Botany Bay, Banks & Solander 1770 (65800); Blakehurst, Camfield 6.1902 (47981); Bundeena, Oxenford 5.1948 (47982); S of Bundeena, McKee 3.1951 (47983, 47984); Plateau W of Scarborough, Johnson 4.1953 (47985); Appin, Maiden 9.1898 (47986); Mt. Murray, Salasoo No. 1435, 12.1955 (58143); Turpentine to Tomerong, Rodway No. 78, 9.1930 (58284); Flat Rock Creek, 5 miles W of Tomerong, Constable 3.1961 (58133); near R.A.N. College, Jervis Bay, Rodway 8.1936 (58285); Parma Creek, 10 miles SW of Nowra, Rodway No. 1790, 7.1935 (58286); N of Sassafras, 20 miles SW of Nowra, Rodway 11.1941 (58287); 3 miles W of Sassafras, Briggs 12.1961 (60643); Jigamy Creek, 6 miles N of Eden, Constable 6.1960 (58134); Bull's Creek, 10 miles S of Eden, Constable 6.1960 (53967). In all other States, but not in the Northern Territory.

The above description covers all forms of the species. In eastern Australian specimens (type form) the female spikelets are 7–15 mm. long and are either solitary or several in the inflorescence. In Western Australia, as well as plants similar to the type form, there are also found forms with female spikelets only 5 mm. in length and up to about 100 in the inflorescence. In these the flowers are much smaller, 2 mm. long compared with 4–5 mm. in the type form. It is doubtful whether there is a sharp distinction between these forms, but the matter requires critical field study in Western Australia.

The chromosome number has been determined for both Eastern and Western Australian specimens of the type form, but not for the atypical form (Sands in Briggs in Contrib. N.S.W. Nat. Herb. 111 (1963) 228; Briggs, *ibid.* 1V (1966) 25).

The synonymy of this species has been rather confused. *Schoenodum tenax* Labill. was based on specimens of two species. The female specimen was, in effect, selected as Lectotype by R. Brown when he based *L. tenax* upon it. The male Syntype belongs to the genus *Lyginia* and was referred by Brown (loc. cit., 248) to *Lyginia imberbis* R. Br., which is now considered conspecific with *L. barbata* R. Br. Despite this, the illegitimate combination *Lyginia tenax* (Labill.) C. A. Gardn., Enum. Pl. Austr. Occ. (1930) 15, was published in place of *L. barbata*, although Gardner (loc. cit., 16) also accepted *Leptocarpus tenax*, thus treating the same name as the basionym of two different combinations, using a different Syntype for each, which is not permissible.

Various names were listed in the synonymy of *Leptocarpus tenax* by Bentham and by Masters. These are as follows: *Restio microstachys* R. Br., Prodr. (1810) 246. The Holotype of this, a male specimen in the British Museum (Natural History), seen, belongs to *Leptocarpus scariosus* R. Br. *Restio laxus* R. Br. (loc. cit., 246, No. 12) is not to be confused with its simultaneous homonym (R. Br., loc. cit., 245, No. 3) which is at present retained in *Restio*. The Holotype of No. 12, a male specimen in the British Museum (seen), and Isotypes in the Kew herbarium (seen), belong to the atypical Western Australian form of *L. tenax* with small spikelets. *R. diffusus* Spreng., Syst. Veg. I (1824) 185, is a new name for *R. laxus* R. Br. No. 12 non No. 3, and therefore also applies to the atypical form of *L. tenax*. *L. thamnochortoides* F. Muell., Fragm. VIII (1873) 96, was accompanied by a reference to "*Restio microstachys* Nees" in Lehm., Pl. Preiss. II (1846) 59 (by implication excluding *R. microstachys* R. Br.), and also by citation of a number of Western Australian localities. The relevant specimens (in Melbourne and Kew) have been examined and all belong to *L. tenax* sens. lat., though both forms are represented. In order to fix the application of the name, a sheet of Preiss No. 1709 (in Melbourne) is here chosen as LECTOTYPE. This is the number cited by Nees under "*R. microstachys* R. Br.  $\alpha$ " and is the basis of Mueller's interpretation of "*R. microstachys* Nees". It matches typical material of *L. tenax*. Finally *R. setuliger* Nees and *L. setuliger* (Nees) F. Muell. (both as "*setuligerus*") must be considered. Bentham referred these to *L. scariosus*, while Masters placed them under *L. tenax*. Unfortunately no duplicate of the Holotype (Preiss No. 1707, male) has been available to us and its identity must remain in doubt for the present.

*Leptocarpus brownii* Hook. f. is recorded by Moore & Betche, Handb. Fl. N.S.W. (1893) 444, but there are no specimens from New South Wales localities in the National Herbarium of N.S.W. or at Sydney University, Melbourne, Kew or the British Museum.

#### 4. HYPOLAENA R. Br.

Perennial, dioecious, with a hard creeping or tufted rhizome. Culms wiry, branched and often flexuose, leafless except for the sheaths which may bear a rudimentary lamina. Male and female inflorescences quite dissimilar. Male spikelets paniculate, pedicellate, several-flowered. Male flowers: tepals 6; stamens 3; anthers 1-locular; filaments very short. Female spikelets 1-flowered, terminal, sessile, solitary or 2-3 together; glumes much longer than in the male. Female flowers: tepals 6, short, broad, membranous, shorter than the ovary. Ovary 1-locular, with 1 ovule; style-branches 3. Fruit a small nut, on the thickened receptacle.

This description does not cover, in all respects, the Western Australian plant, *H. fasciculata* W. V. Fitzg., which is divergent in aspect and to some extent in anatomy and therefore of rather doubtful generic position.

A genus of 2 (or 3?) species, endemic in Australia. *Calorophus* (see below, p. 26) and the South African genus *Mastersiella* Gilg-Benedict, both formerly included in *Hypolaena*, differ strikingly in anatomical and other characters. *Hypolaena*, in the strict sense, is very close to *Leptocarpus*.

*H. fastigiata* R. Br., Prodr. (1810) 251; Kunth, Enum. Pl. III (1841) 415; Hook. f., Fl. Tas. II (1857) 74, t. 137; F. Muell., Fragm. VIII (1873) 84; Benth., Fl. Austral. VII (1878) 239; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 375; Rodway, Tas. Fl. (1903) 234; F. M. Bail., Qld. Fl. VI (1902) 1726; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Ewart, Fl. Vic. (1931) 258; Black, Fl. S. Austral., ed. 2, I (1943) 175; J. H. Willis, Handb. Pl. Vic. (1962) 275; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Distr. (1963) 487. Rhizome shortly creeping, more or less woolly-hairy with glabrous sheathing scales, 3-5 mm. diam. Culms erect or ascending, mostly branched, often flexuose, striate, covered when young with a minute, dense, white tomentum, but appearing greyish and nearly glabrous at maturity due to weathering of the tomentum, 20-50 cm. high, 1-2 mm. diam. Sheaths dark brown, striate, closely appressed, up to 2 cm. long, acute and sometimes aristate; margins membranous and often lacerated. Male spikelets at first cylindrical, changing to narrow-elliptical or obovate, 3-8 mm. long, ca. 2 mm. diam., rich dark brown, few to many at the end of flowering branches, forming nodding or erect panicles. Glumes glabrous, broad-lanceolate, acute. Flowers flattened, ca. 1.5 mm. long; anthers almost sessile, dorsally attached near the base



to the very short filaments. Female spikelets terminal, solitary or 2-3 together, erect, 6-12 mm. long, cylindrical to narrow-pyriform, glabrous, dark brown; principal glumes oblong-lanceolate, acutely acuminate, ca. 8 mm. long. Tepals 6, about equal, in 2 series, shorter than the ovary, very broad, rounded, membranous. Style 3-branched from near the base, deciduous. Nut ovoid, ca. 3 mm. long, 2 mm. diam., hard. Chromosome number:  $2n = 66$  (Briggs in Contrib. N.S.W. Nat. Herb. IV (1966) 25). Fl. Summer. *Calorophus fastigiatus* (R. Br.) F. Muell., Pap. & Proc. Roy. Soc. Tas. 1877 (1878) 117; Moore & Betche, Handb. Fl. N.S.W. (1893) 443 as "*Calostrophus*". For further synonymy see below.

Coast, in damp or fairly dry sandy heath and near the margin of swamps. Lennox Head to Byron Bay, Johnson 4.1962 (61193); Barcoongere State Forest, near Corindi, Floyd 9.1959 (48135); Port Macquarie to Lake Cathie road, Tindale 8.1961 (58125); Myall Lakes to Bula-delah, Sydney University Expedition 8.1934 (SYD); Shoal Bay, Port Stephens, Johnson 2.1947 (4943); S of Nelson Bay, Evans 12.1961 (58126; 58127); between Nelson Bay & Anna Bay, Johnson & Briggs 1.1962 (60650); Blue Mountains, Betche 6.1883 (48136); Peuts' Road, Hornsby to Hawkesbury R., Deane 10.1884 (58121); Curl Curl, Deane 9.1884 (58122); North Head, Port Jackson, Briggs & Johnson 1.1962 (56878); North Head, Briggs 1.1962 (60686); Williams Park, North Bondi, Johnson 5.1951 (48138); Bellevue Hill, Betche 10.1894 (48140); Cooper Park, Bellevue Hill, Johnson 1948 (48139); Centennial Park, Sydney, Forsyth 10.1896 (48141, 48142); Centennial Park, Cheel 3.1899 (48143); Port Jackson, Brown 1802-5 (BM) pieces of male and female SYNTYPES, seen; Port Jackson district, Boorman 10.1901 (48137); Coogee, Deane 12.1884 (58123); Maroubra, Morris 10.1927 (48144); Malabar, Gibbons 8.1964 (64750); Botany, Deane 6.1884 (58124); Tempe, Boorman 10.1899 (48145); Kogarah, Camfield 11.1899 (48146); 1 mile W of Marley Beach, Royal National Park, Briggs 12.1961 (60645, 60646); 2 miles SW of Nowra, Rodway No. 1386, 7.1934 (58119); Jervis Bay, Rodway No. 335, 2.1931 (58118); Braidwood road, 15 miles S of Nowra, Rodway 8.1929 (58120). Also in southern Queensland, Victoria, South Australia, Tasmania and possibly Western Australia (see below).

The single "Blue Mountains" collection (48136) needs confirmation; there are no specimens from definite Tablelands localities, but the Betche collection could have been from the lower Blue Mountains, in the Coast District as defined in this Flora.

Bentham (loc. cit.) states that "In Brown's Prodr. the letters J. M. D. are, probably by some clerical error, affixed both to *H. fastigiata* and *H. exsulca*, which he seems at one time to have regarded as one species, but his herbarium as well as his diagnosis clearly show that he meant to apply the former name to the eastern, the latter to the western plant". This applies well enough to the specimens at Kew, but in the Brown collections at the British Museum there are specimens labelled with Western Australian localities which have the characters of *H. fastigiata* and not those of *H. exsulca*, though we have seen no other material of *H. fastigiata* from Western Australia. The Syntypes of *H. fastigiata* (Port Jackson and Van Diemen's Land, both with male and female pieces) in the British Museum are both that species as here understood, but no Type of *H. exsulca* could be found in the British Museum. In the Kew herbarium there is an Isotype of *H. exsulca* from King George's Sound, W.A., which is *H. exsulca* as interpreted by Bentham and subsequent authors. There are many later collections of *H. exsulca* from Western Australia in various herbaria, but the species is not known from eastern Australia.

In the British Museum are the following: (1) Holotype of *Restio cinerascens* R. Br. (labelled King George's Sound), a male plant which appears to match *H. fastigiata* very well, and which is certainly not *Leptocarpus scariosus*, to which it was referred by Bentham. (2) A sheet with male and female pieces labelled King George's Sound originally named "*Restio pumilus*". This also seems to be *H. fastigiata* and does not match *H. exsulca* in features of the culm, although unfortunately the females are in fruit and the distinctive styles have fallen.

Thus it is desirable to check whether *H. fastigiata* is indeed found in Western Australia, or whether some mis-labelling has occurred in the above cases. In any event *Restio cinerascens* R. Br., Prodr. (1810) 246, appears to be a synonym of *H. fastigiata*. "*R. pumilus*" appears to have been a manuscript name only.

### 5. CALOROPHUS Labill.

Perennial, dioecious, rarely monoecious, with a hard, shortly creeping or tufted rhizome. Culms green, thin and wiry, branched and often flexuose, bearing distant persistent sheaths with or without a rudimentary lamina. Male and female inflorescences not very different. Male spikelets several together, rarely solitary, 1- or several-flowered. Female spikelets solitary, 1-flowered. Male flowers: tepals 6, glume-like or membranous; stamens 3; anthers 1-locular. Female flowers:



tepals 6 or 4; staminodes 3 or none; ovary 1-locular; style branches 2 or 3. Fruit a small ovoid or obovoid nut.

A genus of 3 species, 2 of which are endemic in Tasmania and Western Australia respectively; the third occurs in both eastern Australia and New Zealand.

*Calorophus* has been included in *Hypolaena* by many authors. However, it differs strikingly in both habit and inflorescence as well as in the anatomy of the culms. The Type species of *Calorophus* is the Tasmanian endemic *C. elongata* Labill., which shows anatomical differences from the other two species here referred to the genus. Although the general appearance of *C. minor* and *C. elongatus* is very similar, morphological differences have now been found which probably support division of the genus, but decision on this is deferred until the chromosome number of *C. elongatus* is known.

Labillardière's original spelling is to be retained; it was changed by Mueller to "*Calostrophus*".

**C. minor** Hook. f., Fl. Nov. Zel. 1 (1855) 267. Rhizome shortly creeping, ca. 3 mm. diam. Culms green, terete, wiry, much branched and usually flexuose, 20–200 cm. long, ca. 1 mm. diam. near the base, erect when short, procumbent (or even pendulous over rocks) when longer. Sheaths and floral bracts 3–10 mm. long, greenish, closely appressed, usually with woolly hairs near the apex and bearing a divergent or reflexed subulate lamina 1–4 mm. long. Male spikelets axillary, solitary and sessile, or 2 together and then 1 sessile and the other shortly pedicellate, few-flowered, 4–8 mm. long. Glumes acuminate or mucronate, usually slightly longer than the flower. Male flowers: tepals 6, narrow, hyaline, acute; anthers 1.5–2 mm. long, versatile, exserted on slender filaments. Female spikelets solitary in the upper axils, sessile, 1-flowered, 4–6 mm. long; glumes 1–3, tightly convolute. Female flowers: tepals 4–6, membranous, the inner very short and wrapped closely around the ovary, the outer gradually larger, convolute; styles 3 or 2, exserted and recoiled. Fruit an ovoid-globular nut 1.5 mm. diam., sessile on a thickened receptacle. Chromosome number:  $2n = 24$  (Briggs in Contrib. N.S.W. Nat. Herb. IV (1966) 25). Fl. most of the year. *Calorophus elongatus* Labill. var. *minor* (Hook. f.) Hook. f., Fl. Tas. II (1857) 75; Hook. f., Handb. N.Z. Fl. I (1864) 295. *Calorophus lateriflorus* F. Muell., Fragm. VIII (1873) 87 ("*Calostrophus*"), nom. illegit.; Moore & Betche, Handb. Fl. N.S.W. (1893) 443; J. H. Willis, Handb. Pl. Vic. (1962) 275; Beadle, Evans & Carolin, Handb. Vasc. Pl. Syd. Dist. (1963) 486. *Hypolaena lateriflora* (F. Muell.) Benth., Fl. Austral. VII (1878) 238, nom. illegit.; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 378; F. M. Bail., Qld. Fl. VI (1902) 1726; Rodway, Tas. Fl. (1903) 234; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Ewart, Fl. Vic. (1931) 258; Black, Fl. S. Austral. ed. 2, 1 (1943) 175. *H. lateriflora* Benth. var. *minor* (Hook. f.) Cheeseman (as "Hook. f."), Manual N.Z. Fl. ed. 1 (1906) 762.

Coast and Tablelands. Common in bogs, swampy places, and on wet creek banks, from alpine bogs to sea level, always in acid soils, also on wet cliffs in the hills and mountains, forming thick tangled masses in some places. New England, 5.1873 (48068); Gibraltar State Forest, 40 miles E of Glen Innes, Williams & Winterhalter 10.1954 (48069); Wooli, about 30 miles SE of Grafton, Goddard 8.1963 (63526); Coff's Harbour, Floyd 9.1959 (48070); Barrington Tops, Fraser 8.1929 (40871); Nelson Bay to Anna Bay, Johnson & Briggs 1.1962 (60655); Running Stream, 15 miles SSW of Rylstone, Constable 6.1961 (56578); Annie Rowan Creek, 12 miles N of Newnes Junction, Constable 7.1960 (58145); Fort Rock, Blackheath, Constable 10.1957 (43146); Blackheath, Constable 9.1962 (57943); Narrow Neck Plateau, SW of Katoomba, Constable 10.1962 (63055); Wentworth Falls, Betche 12.1894 (48079); Wentworth Falls, Johnson 9.1948 (6486); Mt. Pindari, Kanangra Tops, Johnson 10.1948 (48080); The Big Plain, 5 miles E of Mt. Werong, Johnson & Constable 10.1951 (17759); Mt. Werong, 25 miles S of Oberon, Constable 11.1962 (63100); Salvation Creek, Ku-ring-gai Chase, W of Pittwater, Johnson 4.1951 (48072); Berowra, near Railway Station, Salasoo No. 751, 8.1951 (48073); Hornsby, Blakely 9.1916 (48074); Manly, Deane 6.1885 (48075); North Head, Port Jackson, Briggs 1.1962 (60696); North Sydney, Cleland 1.1912 (48076); Drummoyne, Deane 11.1884 (48077); Bondi, Deane

12.1884 (48088); South Coogee, Mair 10.1954 (58144); Waterfall, Mair & Constable 11.1950 (16416); Bulli Pass, Rodway No. 1749. 5.1935 (66333); 1 mile E of Fitzroy Falls, Johnson 4.1951 (48081); Fitzroy Falls, Rodway 10.1918 (66335); Mt. Keira, McBarron No. 8368, 10.1963 (65819); Barber's Creek, Tallong, Maiden 2.1898 (48082); Mt. Ginini, Gray 2.1961 (58146); Bimberi Peak, Cambage 1.1912 (48083); Happy Jack's Creek, Snowy Mts., Johnson 3.1964 (64119); Pretty Point, Mt. Kosciusko, Maiden & Forsyth 1.1899 (48085); Digger's Creek, Koseiushko district, Johnson & Constable 1.1951 (16361); Hotel to Betts' Camp, Mt. Koseiushko, Maiden 2.1914 (48086); Mt. Kosciusko, Maiden & Forsyth 1.1899 (48087, 48088). Also in southern Queensland, Victoria, South Australia, Tasmania and New Zealand.

The description under *Restio lateriflorus* R. Br., Prodr. Fl. Nov. Holl. (1810) 247, applied to this species but Brown's name must be regarded as nomenclaturally based on the Tasmanian *Calorophus elongatus* Labill. which Brown cited as a synonym (non *R. elongatus* Thunb. 1805). In describing *Calorophus lateriflorus*, however, F. Mueller explicitly excluded *C. elongatus* Labill., and Mueller's name must be regarded as new, dating from 1873; it is illegitimate, however, since he cited the earlier *C. minor* in synonymy. Bentham (1878) mistakenly supposed that *C. elongatus* Labill. was a mixture of two elements and applied the new illegitimate name *Hypolaena longissima* Benth. to the true *C. elongata*, using *H. lateriflora* for the present species. Since the latter excluded the type of *C. elongata* Labill. it cannot be regarded as nomenclaturally based on *Restio lateriflorus* R. Br. but rather on *Calorophus lateriflorus* F. Muell. Masters' treatment was essentially similar from the nomenclatural point of view.

The variation in habit is so continuous that there seems no point in recognising varieties within the species, as was done by Cheeseman, loc. cit. The New Zealand material can be matched very well by specimens from Australia.

### 6. COLEOCARYA S. T. Blake

Perennial monoecious herbs with a hard creeping rhizome. Culms simple or branched, leafless except for the sheaths. Male and female inflorescences on the same culm, but differently arranged. Male spikelets terminal, solitary, several-flowered. Female spikelets axillary, solitary, 1-flowered, enclosed in the axils of sheathing floral bracts near the base of the culm. Male flowers: tepals 6; stamens 3. Female flowers: tepals 6; ovary 1-locular; style undivided. Fruit hard, bony, indehiscent.

A genus of a single species, endemic in Australia and confined to the North Coast of New South Wales and southern coastal Queensland.

*C. gracilis* S. T. Blake in Proc. Roy. Soc. Qld. LIV (1943) 75. Rhizome horizontally creeping, woolly-hairy, with a further partial covering of imbricate, scarious, glabrous, pale brown scales, 3-4 mm. diam. over all. Culms green, simple or branched, erect or ascending, terete, 15-30 (-45) cm. high, ca. 1 mm. diam. Sheaths lax, erect or slightly spreading, truncate, with a small subulate or terete rudimentary lamina. Subtending floral bracts similar but more lax. Male spikelets ovoid to narrow-ovoid, 8-10 mm. long, erect, solitary and terminal; 8- to 10-flowered in the specimens seen; glumes oblong, obtuse, mucronate, sub-concave, 3.5-5 mm. long. Male flowers: tepals 6, the outer oblanceolate, obtuse, the 2 laterals folded, keeled and slightly incurved, 3.5-4 mm. long, the 3 inner much narrower, almost linear; anthers linear, apiculate, 2-2.5 mm. long. Female spikelets axillary, solitary, each almost wholly enclosed in the floral bract at the node in the lower portion of the culm; glumes 2-3, oblong, obtuse, mucronate, 7-8 mm. long. Female flowers: tepals 6, 4-5 mm. long, the 3 outer oblanceolate, obtuse, the lateral 2 of these slightly curved and keeled, the other flat; 3 inner tepals much narrower, approximately linear. Nut dark brown, smooth, oblong, rounded at the ends, slightly flattened, elliptical in cross section, 3.5-4.5 mm. long, 1.5 mm. wide, seated upon the short, thickened, whitish receptacle. Chromosome number:  $2n = 22$  (Briggs in Contrib. N.S.W. Nat. Herb. IV (1966) 26).

North Coast, in scrub or heath ("wallum") or sand, often in not very wet places. 2 miles S of Byron Bay, on Ballina road, Constable 5.1962 (61211); Hat Head to Kinchela Creek, 5 miles by road from Kinchela, Johnson & Briggs 1.1962 (60647, 60648); Hat Head to Kinchela Creek, Johnson 10.1953 (26299); Hat Head, Korogora Pt., Constable 1.1953 (22085); Hat Head, Ingram 1.1961 (60221). Also in south-eastern Queensland.

93	Crassulaceae	143	Melastomataceae
94	Escalloniaceae	144	Onagraceae
95	Pittosporaceae	145	Haloragaceae
96	Cunoniaceae	146	Araliaceae
97	Davidsoniaceae	147	Umbelliferac
98	Rosaceae	148	Alangiaceae
99	Mimosaceae	149	Ericaceae
100	Caesalpiniaceae	150	Epacridaceae
101	<i>Papilionaceae, Part I</i>	151	Myrsinaceae
102	Geraniaceae	152	Primulaceae
103	Oxalidaceae	153	Plumbaginaceae
104	Linaceae	154	Sapotaceae
105	Erythroxylaceae	155	Ebenaceae
106	Zygophyllaceae	156	Symplocaceae
107	Rutaceae	157	Oleaceae
108	Simaroubaceae	158	Loganiaceae
109	Burseraceae	159	Gentianaceae
110	Meliaceae	160	Menyanthaceae
111	Tremandraceae	161	Apocynaceae
112	Polygalaceae	162	Asclepiadaceae
113	Euphorbiaceae	163	Convolvulaceae
114	Callitrichaceae	164	Polemoniaceae
115	Anacardiaceae	165	Hydrophyllaceae
116	Aquifoliaceae	166	Boraginaceae
117	Celastraceae	167	Verbenaceae
118	Siphonodontaceae	168	Avicenniaceae
119	Hippocrateaceae	169	Labiatae
120	Stackhousiaceae	170	Solanaceae
121	Icacinaceae	171	Scrophulariaceae
122	Sapindaceae	172	Selaginaceae
123	Akaniaceae	173	Bignoniaceae
124	Rhamnaceae	174	Pedaliaceae
125	Vitaceae	175	Martyniaceae
126	Elacocarpaceae	176	Orobanchaceae
127	Tiliaceae	177	Gesneriaceae
128	Malvaceae	178	Lentibulariaceae
129	Sterculiaceae	179	Acanthaceae
130	Dilleniaceae	180	Myoporaceae
131	Eucryphiaceae	181	Plantaginaceae
132	Hypericaceae	182	Rubiaceae
133	Elatinaceae	183	Caprifoliaceae
134	Frankeniaceae	184	Dipsacaceae
135	Violaceae	185	Cucurbitaceae
136	<i>Flacourtiaceae</i>	186	Campanulaceae
137	Passifloraceae	187	Lobeliaceae
138	Cactaceae	188	Goodeniaceae
139	Thymelaeaceae	189	Brunoniaceae
140	Lythraceae	190	Stylidiaceae
141	Rhizophoraceae	191	Compositae
142	Myrtaceae		

## PTERIDOPHYTA

192	Lycopodiaceae	205	Pteridaceae
193	Selaginellaceae	206	Adiantaceae
194	Isoetaceae	207	Vittariaceae
195	Psilotaceae	208	<i>Davalliaceae</i>
196	Ophioglossaceae	209	<i>Grammitidaceae</i>
197	Marattiaceae	210	<i>Polypodiaceae</i>
198	Osmundaceae	211	<i>Aspidiaceae</i>
199	Schizaeaceae	212	Thelypteridaceae
200	Gleicheniaceae	213	Aspleniaceae
201	<i>Hymenophyllaceae</i>	214	Blechnaceae
202	Cyatheaceae	215	Marsileaceae
203	Dicksoniaceae	216	Azollaceae
204	Lindsaeaceae	217	Salviniaceae

